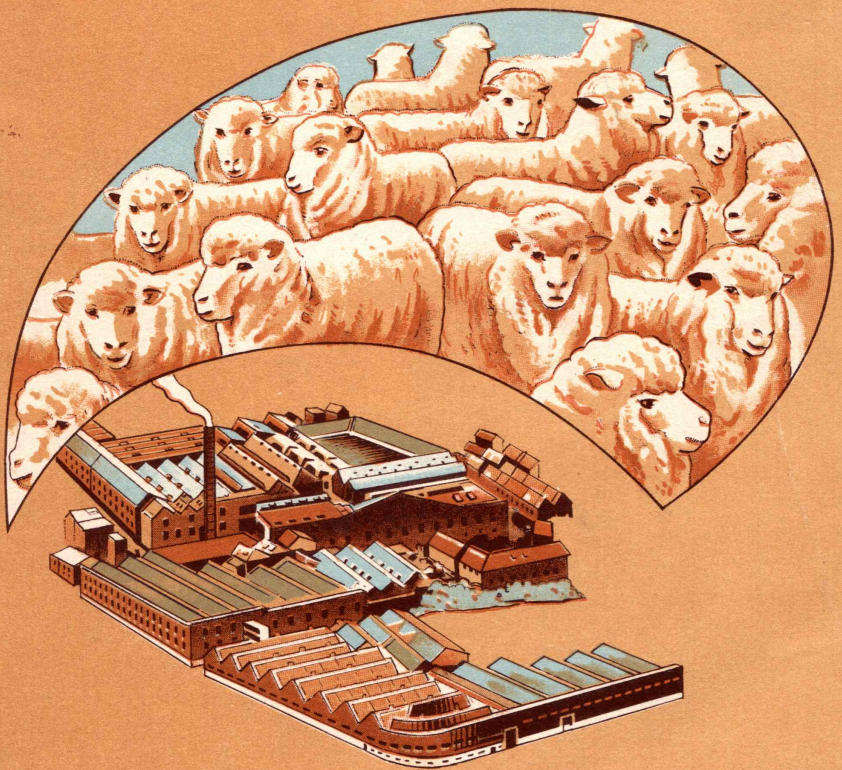
Roslyn



THE SAGA OF A WOOLLEN MILL

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THE SAGA OF A WOOLLEN MILL

The Story of the Roslyn Worsted and Woollen Mills

COMPILED
BY THE PROPRIETORS
ROSS & GLENDINING LTD.
DUNEDIN NEW ZEALAND

2nd Edition (Revised)

PHOTOGRAPHS BY J. WELSH

PRINTED BY WHITCOMBE & TOMBS LTD.

THE ROSLYN INDUSTRY

THE FIRM OF Ross & Glendining (formed into a limited company in 1900) was established in the year 1862 as a retail soft goods business in Princes Street, Dunedin, so that fourteen years after the foundation of Otago, in March 1848, the history of the firm became bound up in the history of Otago.

In 1866—four years after its inception—the firm forsook the retail business and became wholesale warehousemen and importers of soft goods, with premises in Stafford Street.

Some of the early settlers were now beginning to run sheep stations, with the consequent export of wool to England, the founders of the firm, Mr. John (later Sir John) Ross and Mr. Robert Glendining, soon saw the desirability of manufacturing some of their own woollen products from New Zealand grown wool. The Roslyn Woollen Mill was erected on the banks of the Kaikorai Stream in the year 1878 for the manufacture of blankets, flannels, rugs, etc., and the history of Roslyn began.

Notwithstanding all the troubles and set-backs which meet a new venture, the Mill prospered and by 1883 more carding machines and looms had been installed.

In 1881 the first telephone used for commercial purposes in New Zealand was installed between the Mill and the warehouse, while in 1882 the Mill was again the first to use a modern invention when electric light was introduced, the current being generated by a dynamo driven off the main engine.

The manufacture of knitted goods was taken up in the early days, the first six knitting frames being purchased in 1881 for the manufacture of knitted pants and socks.

The wisdom of the steps so far taken was speedily and abundantly demonstrated. The goods produced were so favourably received and so largely demanded that in 1885 the firm was led to consider the big problem of introducing the manufacture of worsted which had not then been attempted south of the Equator.

To provide the power to cope with the new additions, a 340 horse-power compound Steam Engine was installed and is still in use. The Mill was now in a position to manufacture the whole range of woollen and worsted goods and its title was therefore changed to the Roslyn Worsted & Woollen Mills.

In 1900 further buildings were erected to house the worsted and hosiery sections, and the now famous Delta Wet Chlorination process for pre-shrinking was inaugurated.

Ross & Glendining Ltd. are now one of the biggest buyers of wool at the New Zealand wool sales, but up to the year 1907 they did not depend solely on this source of supply, as they were large sheep station holders. Their Lauder and Blackstone Hill

stations contained about 120,000 acres and Barewood station comprised 30,000 acres. These stations, which were disposed of in 1907, carried from 80,000 to 90,000 sheep.

The years 1908-1909 saw the first installation of electric motors, and from 1918 to 1922 there were big increases in the number of carding machines, spinning mules and weaving looms. A new boiler house was installed during these years of progress.

The welfare of the staff was considered also by the building, in 1941, of a large and modern Cafeteria and the establishment, two years later, of a fine health clinic under the supervision of a fully trained nurse.

In 1944 the Mill laboratory was built and placed under the charge of a chemist who also controls the newly established "Dri-klor" Dry-Chlorination plant.

Improvements are continually being made by the installation of new machinery which further increases the production of the Mill and keeps it to the forefront of the industry.

Over the many years since 1862, Ross & Glendining Ltd. have greatly extended their manufacturing operations and now there are in existence factories for the manufacture of men's and women's clothing, coats, frocks, boots, shoes and sandals, hats, shirts and pyjamas, underwear (wool, locknit and interlock), oilskin clothing, children's wear, millinery and knitwear, so that to-day it can be truthfully stated that every article of human apparel can and is being made by the firm in one or another of its factories.

From their commencement in 1862, with a staff of two, Ross & Glendining have grown until to-day they employ over two thousand people, and there is no doubt that the firm's economic progressive policy has played an important part in the history of the Dominion.

ROSS & GLENDINING LIMITED

HEAD OFFICE:
Dunedin

BRANCHES:
Auckland, Wellington, Christchurch

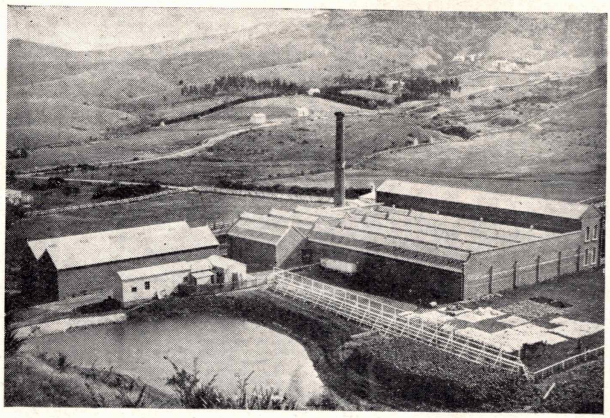
SUB-BRANCHES:
Napier, New Plymouth, Wanganui, Nelson, Greymouth, Invercargill

ROSLYN WORSTED & WOOLLEN MILLS:
Kaikorai, Dunedin

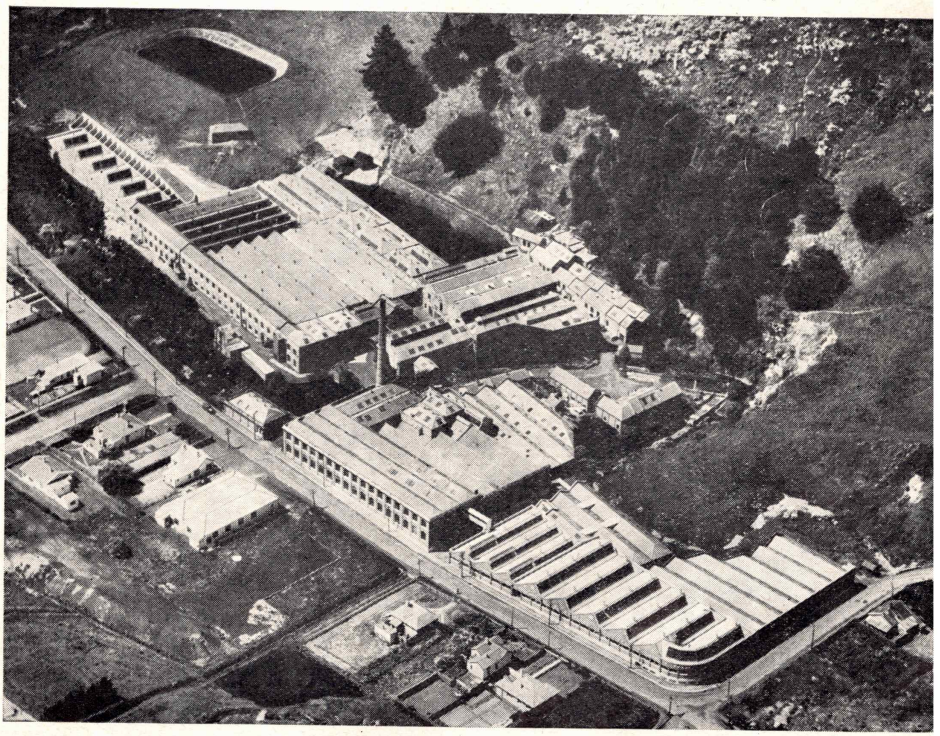
FACTORIES:
Dunedin—Footwear, Clothing, Mantles, Gowns, Felt Hats
Auckland—Shirts, Clothing, Oilskins, Millinery, Underwear
Christchurch—Regent Footwear

ASSOCIATE COMPANIES:
Childswear Ltd., Auckland; Clifton Knitwear, Christchurch

LONDON OFFICE:
65 London Wall, E.C.2



The Roslyn Woollen Mill during its early years.



The Roslyn Mills to-day.

THE INDUSTRY AND WOOL-SORTING

THE WOOLLEN INDUSTRY is the oldest industry in the British Commonwealth of Nations, and the history of England and of New Zealand is largely the history of wool. Very much of interest could be written about the industry—long before the Roman invasion of England the ancient Phoenicians traded their cloth in Cornwall in exchange for tin, dyes and raw wool. English history records that the first domesticated sheep were known in Britain amongst the Celtic tribes round about 700 B.C.

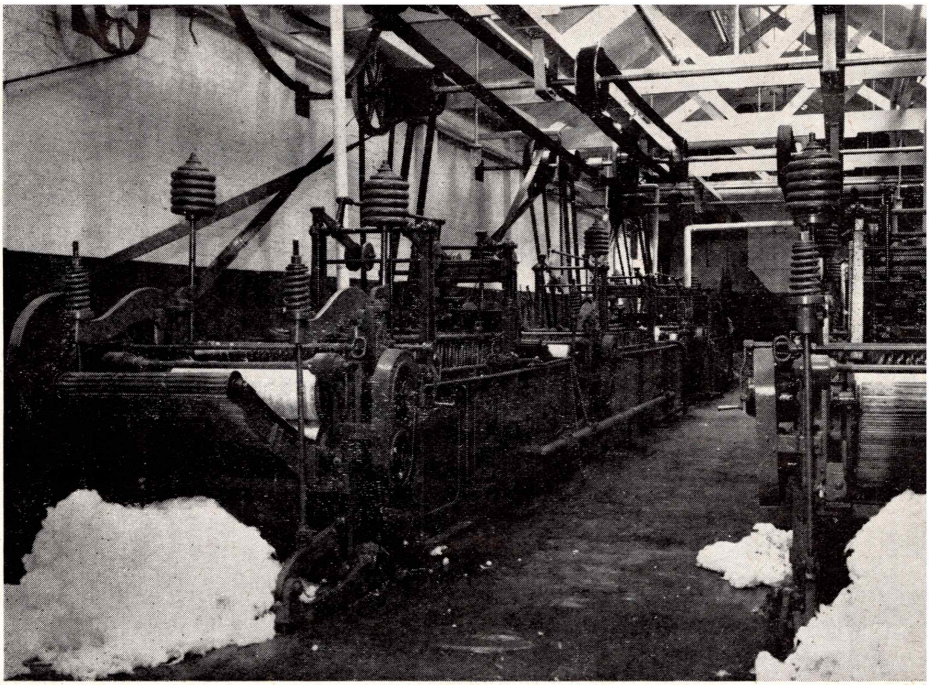
In the year 55 B.C. Julius Caesar reported back to his native Rome that the Britons had developed the arts of spinning, weaving and dyeing of wool in a way unknown elsewhere in the world. The great Roman chronicler Pliny describes the establishment of a weaving factory at Winchester to encourage the production of the much coveted British cloth during the Roman occupation of Britain.

Cloth weaving as a craft was not fully developed until the reign of Edward III, who invited skilled Flemish weavers over to England and, at last, in the year 1688 James II proclaimed the industry "The Staple Manufacture in this Our Kingdom."

This, then, is our heritage, and we claim that our craft to-day at "Roslyn" is as well developed and in keeping with the times as anywhere else in the world. The first evidence of inherited craftsmanship is found in the wool sorting room. Here, after the wool buyer has bought his season's wool according to the known requirements of the management, the wool sorters divide this wool by hand, feel and sight into the classifications required. Wool sorting is skilled work and is of the greatest importance in the industry as the final quality of a garment depends to a large extent on the classification made at this stage. The fleeces are sorted according to length, diameter (fineness), soundness and colour of the wool, and as there are often many grades in each fleece they are classified to standards set up by "Roslyn", to be later blended into mixtures which will produce the various characteristics required to make the highest quality goods, for example, worsteds, knitwear, underwear, tweed, blankets, rugs and other well known "Roslyn" products.

SCOURING, DRYING AND CARBONISING

AFTER SORTING, the different qualities are packed into their various bins ready to be drawn from as required. The wool so drawn off is passed through an opening machine which extracts some of the loose dirty matter and opens up the wool ready for washing, or, as we term it, "scouring". In this process the wool



Scouring Machines.

is gently paddled through different cleansing solutions in order to remove all dirt and "yolk". Very great care must be exercised in this department to ensure that the solutions and temperatures are kept at a correct standard, otherwise damage will be done to the wool fibres. The wool now passes through a hot-air drying machine, again under careful control, and is then ready to start on its journey through the Mill to either the "woollen" or "worsted" yarn-making sections.

Some of the wools after scouring still contain a certain amount of vegetable matter and seed, therefore these particular wools are "carbonised". "Carbonising" consists of immersion in acid of certain strength, followed by drying at high temperature. This treatment reduces the vegetable matter to carbon, which is crushed and shaken out of the wool by a dust-extracting machine. The acid is then neutralised from the wool by an alkaline immersion followed by further rinsing and drying.

DYEING

WOOL MAY BE dyed by any one of three processes, namely, in a loose state as it comes from the carbonising and scouring processes, as part of the preparation for the making of woollen yarns, in top form for use in the re-combing for worsted spinning, and in the piece after it has been made into fabric.

Top Dyeing Machine.

The loose wool is dyed in large vats into which it is tightly packed, being held in place by heavy lids. The tops are dyed in the top dyeing machines, each top placed in a separate perforated cylindrical compartment. In both these methods the dye liquors are circulated through the material.

In piece dyeing the ends of each piece are sewn together to allow it to be drawn through the dye bath by means of an overhead roller or winch over which it is passed.

After the dyestuff has been mixed with boiling water, the solution is added to the water already in the machine. Chemical agents are added to assist the woollen fibres in absorbing the dyestuff and to ensure maximum penetration, and the fixing of the dyeing is done at boiling point.

After dyeing the surplus moisture is removed from the wool, tops and pieces by a centrifuge or spin-dryer.

Dyeing is a very skilled operation, requiring a good eye for colour to see that different dyeings of the same quality and shade do not vary. Great care must also be taken to select the dyes best suited to withstand the many changes in conditions encountered in everyday use. They must be fast to sunlight, washing and perspiration. Mothproofing may also be incorporated in the dyeing operation.

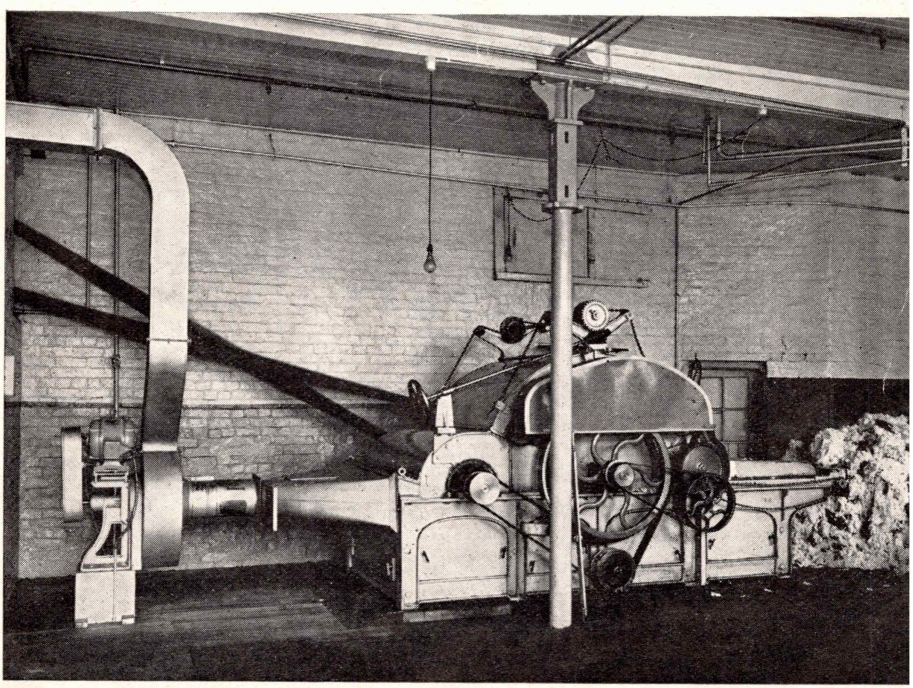
PREPARING FOR WOOLLEN YARN MAKING

THE WOOL NOW goes to make either "worsted" or "woollen" yarn, according to the type of cloth or fabric to be manufactured. Woollen yarns, in general, have a full and fibrous appearance and are used for the manufacture of blankets, tweeds, ladies' frockings, coatings, rugs and other products where softness of handle, "cover" or "nap", is required. We follow the woollen process first, to a "teasing" or willowing machine.

Here the various qualities and colours of wool are laid in layers and each layer is treated with a special oil emulsion to make the wool fibres more pliable and easier to manipulate in the teasing, carding and spinning.

The complete stock pile is broken down vertically and fed to the willowing machine, where the wool passes over a large, fast-running roller and between smaller and slower rollers covered with strong curved steel teeth which open the wool and make it suitable for carding.

The blend is teased at least twice in order to thoroughly mix and open the components and spread the lubricant. After the final teasing, the wool is blown to storage bins behind the carding machine in the next processing department.



Teasing or Willow Machine.

WOOLLEN CARDING

THE CARDING MACHINE, with its length of 50 feet, is one of the largest used in the manufacture of woollen fabrics, and it carries out a variety of automatic operations, including weighing, combing, straightening, mixing, and gradually refining the density of the fibres until it finally splits the amalgamated fibre "sliver" into soft threads to be delivered on spools or bobbins.

The general carding process is carried out as the wool passes between various sized rollers running at different speeds. The largest of these rollers is at least 50 inches in diameter and 60 inches wide, and they are all covered with fine wires, slightly bent, the average cylinder containing 4,000,000 of these wire-points.

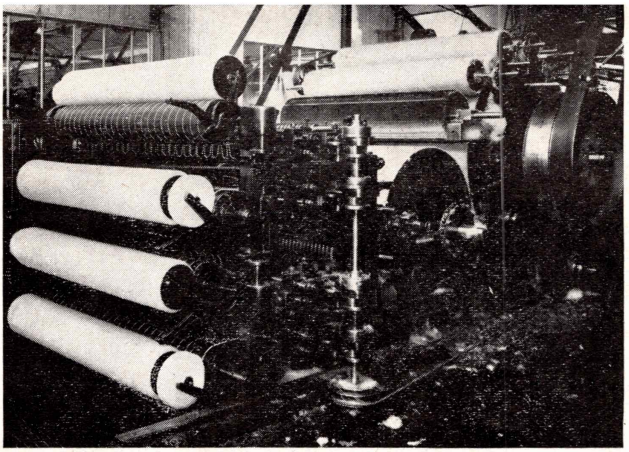
As the cylinders carry the blend forward, it is gradually opened and mixed by the inter-action of the teeth and the speeds and rates of revolution of the various rollers.

The wool leaves the last roller of the machine in the form of a fine sliver resembling a spider's web. The condenser section then divides this sliver into either 100 or 150 ribbons of wool which are finally rubbed to make them round and sufficiently adhesive to withstand the tensions encountered in the spinning process. In this department, the correct weight, quality and appearance of the cloth is largely determined, and on the quality of the carding depends the work of all the subsequent operations.

WOOLLEN SPINNING

THE SPOOLS from the carding machine are now mounted on either the spinning mule or the ring spinning frame where the twistless slivers are drawn out in length and reduced in thickness to erradicate any slight irregularities which might be present. On the mule this work and that of imparting the twist is carried out by the spindles mounted on a carriage which moves away from the condenser bobbins. As it returns, the twisted wool is wound on to bobbins. The ring frame is continuous in action and the drawing, twisting and winding all take place at the same time. The wool now has been processed into spun yarn of the correct weight, strength and character to make woollen cloth or fabric.

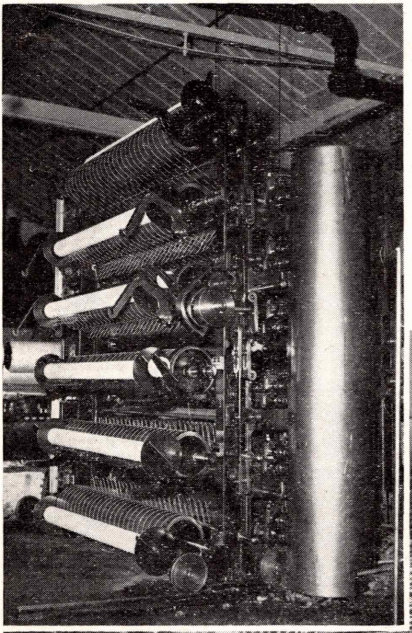
We now leave the woollen yarn section and return to the scoured and dried wool which has been sorted, by virtue of its fine character and even length of staple, to be processed into worsted yarn. The woollen yarn, previously described, differs greatly from the worsted in appearance as well as in the process of manufacture. The woollen yarn is full and elastic with the fibres in criss-cross order, as distinct from the parallel formation of the fibres in the worsted yarn.

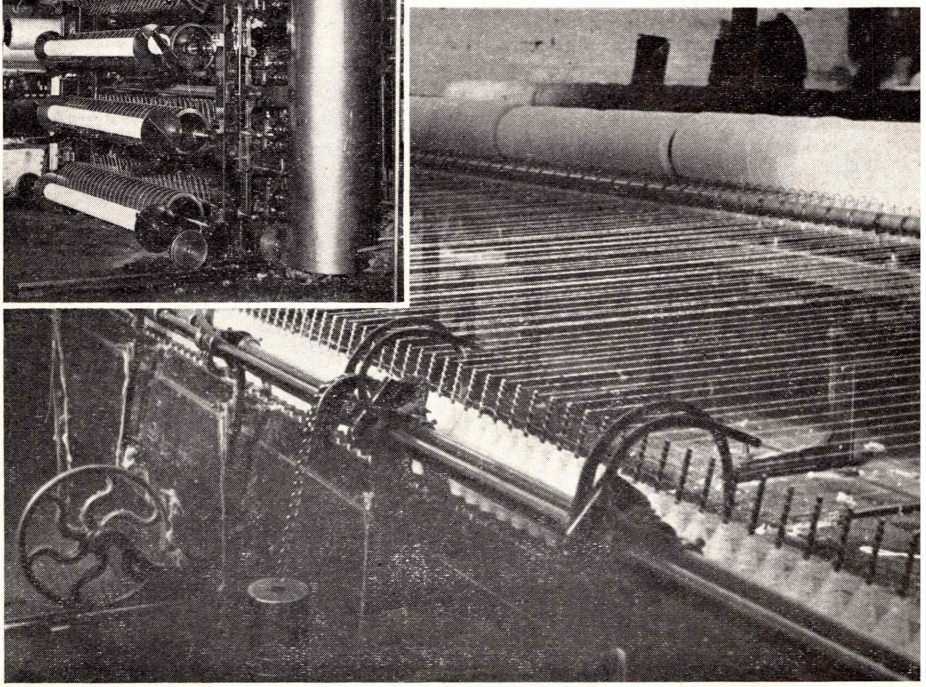


The top photograph shows the condenser end of the carding machine with the condenser bobbins at the left of the machine. In the background can be seen part of the various sized rollers of the carding process.

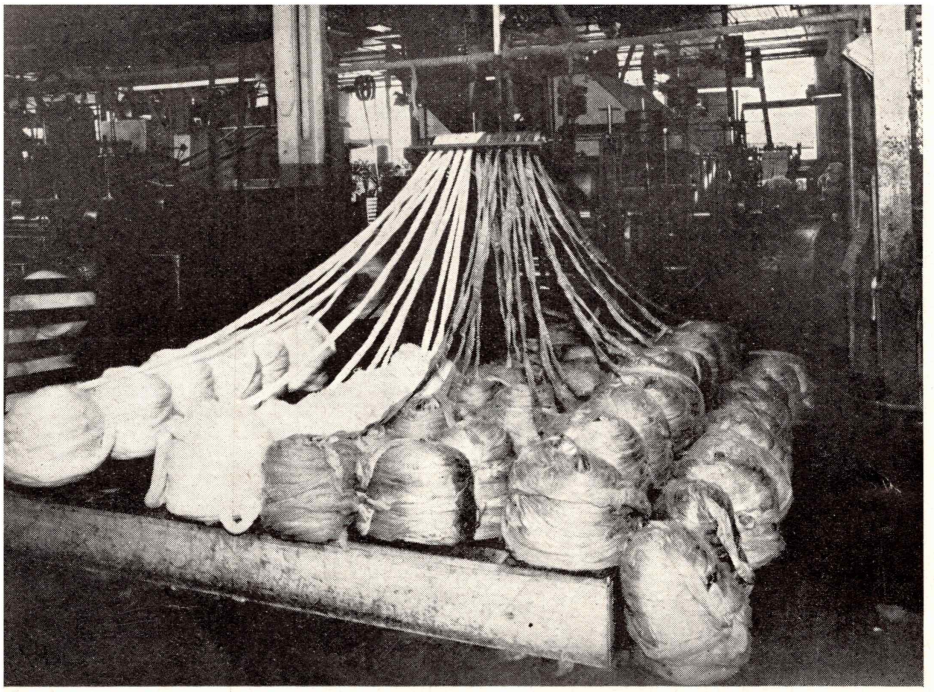
The photograph to the left illustrates the new style of condenser end with six bobbins in place of the usual four.

The condenser ends may be seen at the rear of the spinning mule in the photograph below. The carriage and the spindles are in the foreground.





Woollen Carding Machine Condenser end of Carding Machine.
Woollen Spinning Mule.



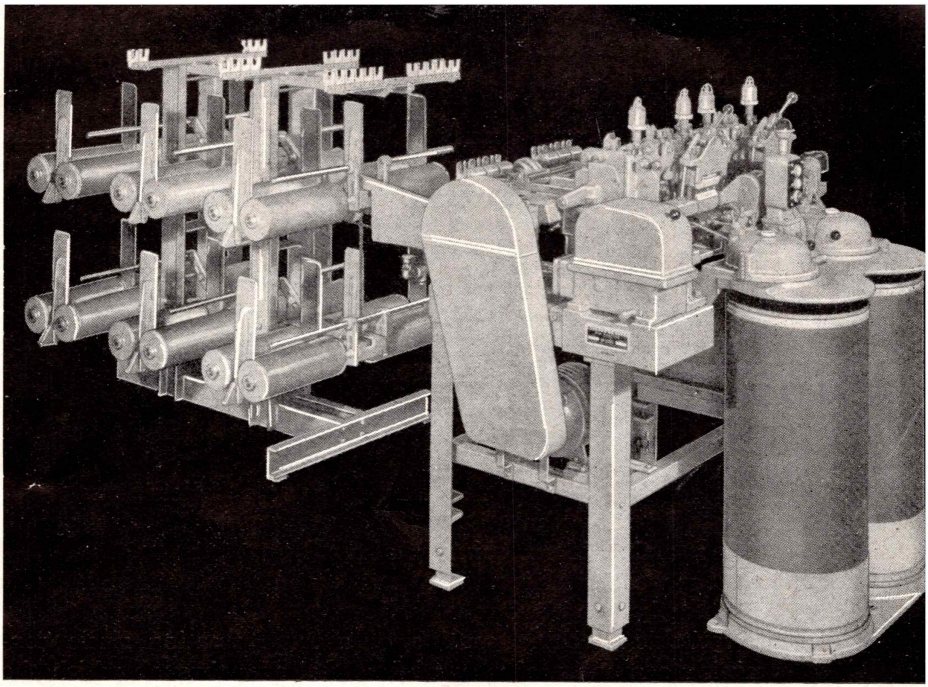
The Backwashing and Drying Machine used after the tops are dyed.

THE WORSTED PROCESS

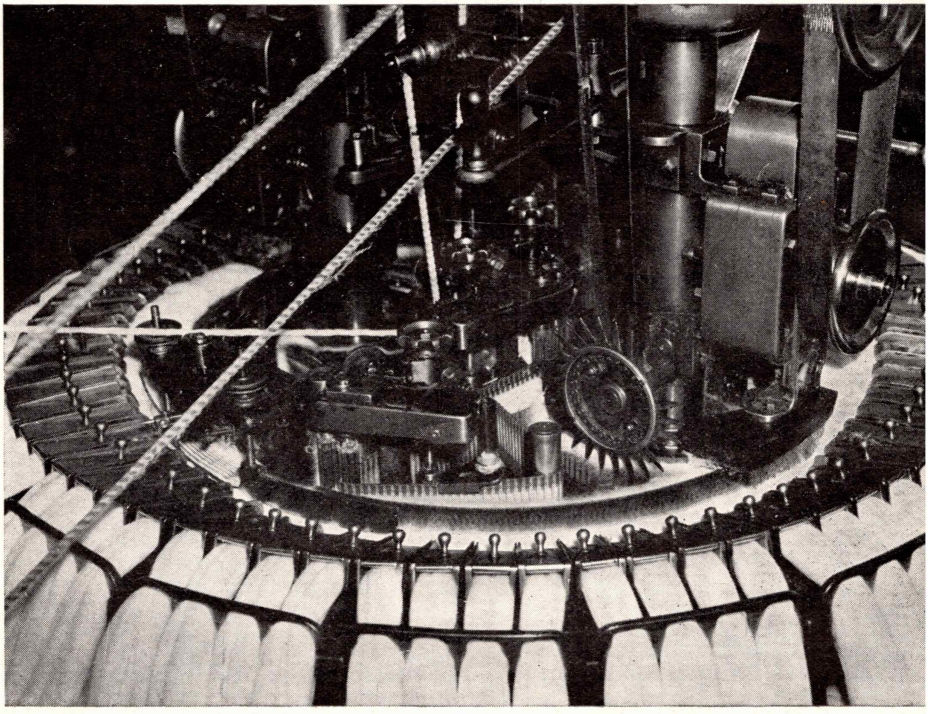
IN THE WORSTED PROCESS all the short fibres are extracted and the many subsequent processes are designed to keep all the remaining long fibres parallel to each other in the spun yarn. Yarns spun in this manner are generally finer in count, more even in character and stronger than the woollen spun yarn. All our worsted suitings, boys' knicker serges, some ladies' frockings, together with other fine tough cloths, are made from "worsted" yarn, and these cloths can generally be distinguished from the woollen section by their finer, closer texture, with little or no cover or "nap" and their crisper, firmer handle.

Most of our famous "Roslyn" underwear, socks, golf hose, and knitted goods, such as frocks, cardigans, pullovers, swim suits, etc., are also made from worsted yarn, as is our "Aotea" fingering wool.

In most of the other woollen manufacturing countries, manufacturers do not make both woollen and worsted material, in fact, in the worsted section it is quite usual for the process to be split up amongst different manufacturers. At "Roslyn", however, all the processes in both woollen and worsted manufacturing are handled right from the baled wool to the finished articles, and we are able to control and maintain our standards throughout manufacture.



One of the new Pin Drafting Machines.



The Worsted Combing Machine showing the slivers of wool before they become Tops.

The clean wool is first put through a worsted carding machine, as already described in the woollen section, the main difference being that the worsted card is not so large as the woollen card and the wool from the last roller is not divided into a number of threads, but is delivered in a continuous ribbon of wool which is rolled by the machine into a ball. The ribbons of wool from a number of these balls are now amalgamated and run together through a number of gilling machines.

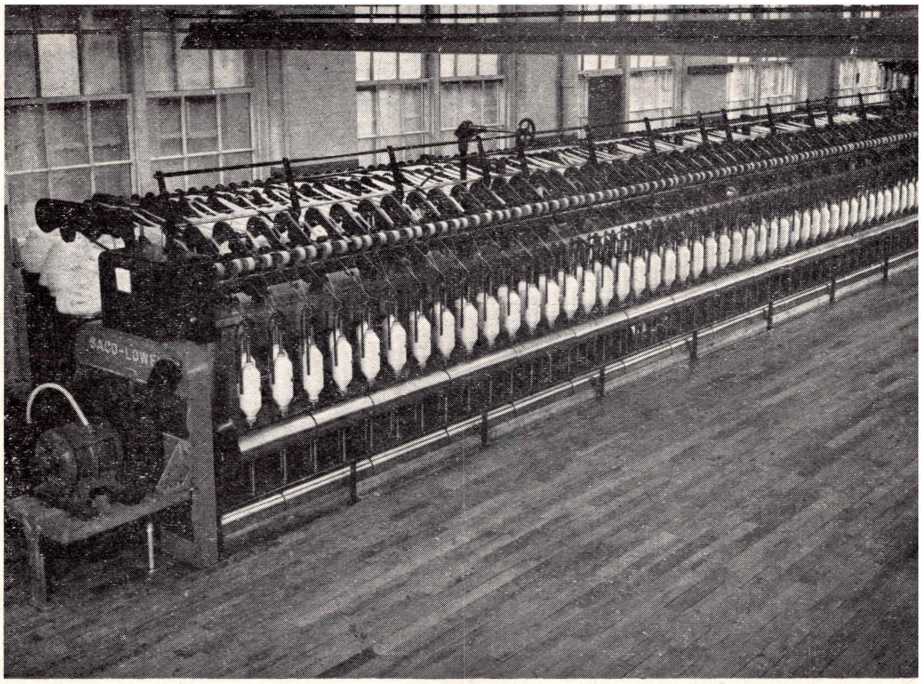
The gilling machine takes the ribbons or "slivers", as they are termed, through a pair of steel back rollers and passes them to the front rollers which travel at a much greater pace than the back rollers. This action draws the combined slivers back down to one thin ribbon again. While the wool is on this journey, a number of fine toothed combs, or "fallers", are passed rapidly into the wool so that the drawing action is accompanied by a straightening or combing of the fibres of the wool.

The wool sliver is now pressed into tight balls and a number of these balls are mounted on to the combing machine. This remarkable machine consists of a large rotating circle containing a number of rows of fine steel pins through which the slivers of wool pass after being pressed down into the pins by rapidly moving dabbing brushes. As the wool passes through the pins, the long fibres are drawn off in one direction, while the short fibres are held by two smaller pin circles which revolve inside the large circle. The long fibres amalgamate and are passed out of the machine in the form of a ribbon, while the short fibres are rejected and take no further part in the making of the worsted yarn. A number of the combed slivers now pass through another gilling process to be delivered in the form of a ball which is known as a "top".

The tops are usually stored for some time to allow the wool to cool, settle down and recover from its strenuous passage through the processing up to date, and to gain a certain amount of moisture from the atmosphere.

RE-COMBING, DRAWING AND ROVING

THE WOOL TOPS, after their rest period, are now ready to be treated in various ways. Some of the wool is dyed into different colours at this stage, and after washing and drying it is combed all over again in order to lay the fibres all parallel after being disturbed by the dyeing, washing and drying processes. After two further gilling operations, the wool tops are delivered on to large flanged bobbins in the form of a rope ready for the next operation, which is called drawing. As its name would signify, this process is a method of amalgamating a number of the ends, at the same time drawing them into diminishing sized ropes. As eveness is one of the requirements of a good worsted yarn,



Full view of one of the new 84-Spindle Cone Roving Machines.

wool tops have to go through a number of the drawing and doubling operations before the strands are ready for spinning. The number of times this operation is carried out is largely determined by the ultimate thickness or count of the final yarn required, and the last process of drawing delivers a thin sliver or "roving" which has a specific weight for a given number of yards. The roving is delivered on small flanged-end bobbins and is now ready for spinning.

Following its policy of always advancing with the times and using the most modern methods available, the Mill is installing a completely new system of processing which, when completed, will be the first of its kind in this country.

The method is known as Pin Drafting and is capable of producing a sliver much more level in itself than is possible with the machinery usually employed. After the pin drafted slivers have been processed through a high draft roving frame, they are ready for spinning.

SPINNING AND TWISTING OR FOLDING

SPINNING is the last process in the conversion of wool into yarn, and the wool now receives its final reduction in weight and thickness.

It is necessary to apply sufficient twist to the yarn to give it enough strength to stand up to the further processing of cloth

A Cap Spinning Machine.

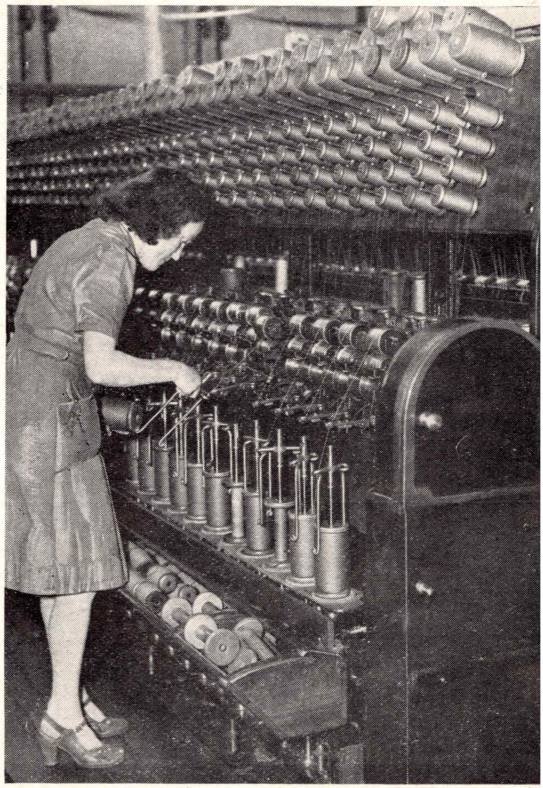
A Fly-spinning Machine.

weaving or fabric knitting, and this is carried out by three different methods, according to the fineness and character required in the spun yarn.

The first of these processes is called "fly spinning" and here the twist is inserted in the yarn by a flyer arm which, at the same time, wraps the yarn on to a spinning bobbin. "Aotea" fingering wool and some knitting yarns are spun by this method and, although it is comparatively slow, it gives a yarn with the very smooth surfaced finish required for Roslyn products.

"Ring spinning" is the second method, in which the yarn is spun by means of a steel "traveller" running round a grooved "ring" carrying the yarn with it before delivering it on to the bobbin. Most medium count yarns may be spun by this method, which is rapidly gaining favour in most countries.

"Cap spinning" is our third method in which a stationary steel cap is placed, mouth downward, over the spinning spindle. The yarn "balloons" down the side and round the bottom of the cap and so on to the bobbin. Yarns of the very finest counts for tweeds and knitting fabric are usually spun by this method.

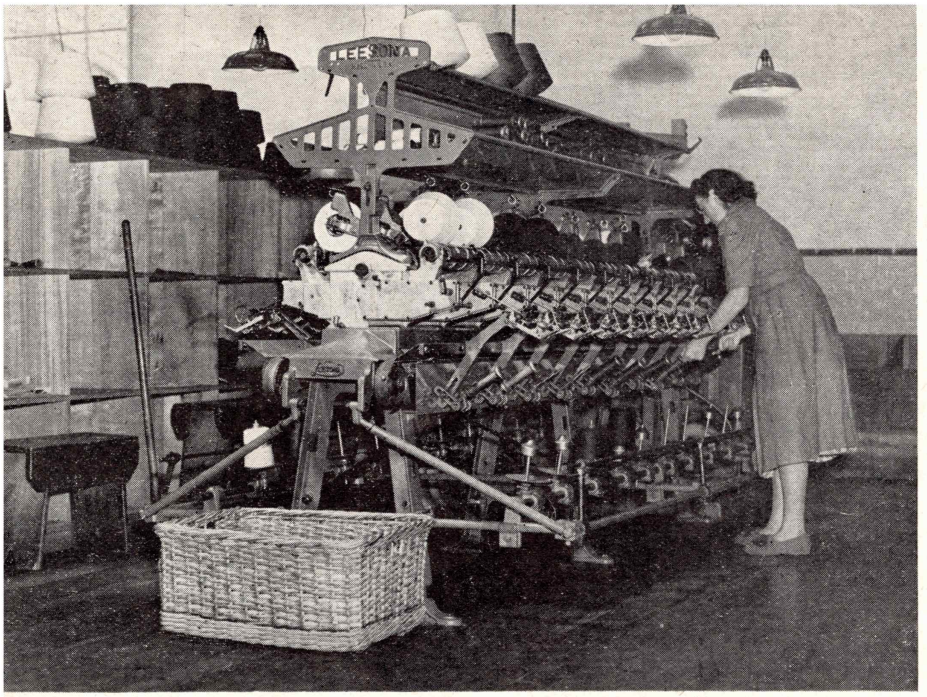


Doubling "Aotea" Yarn.

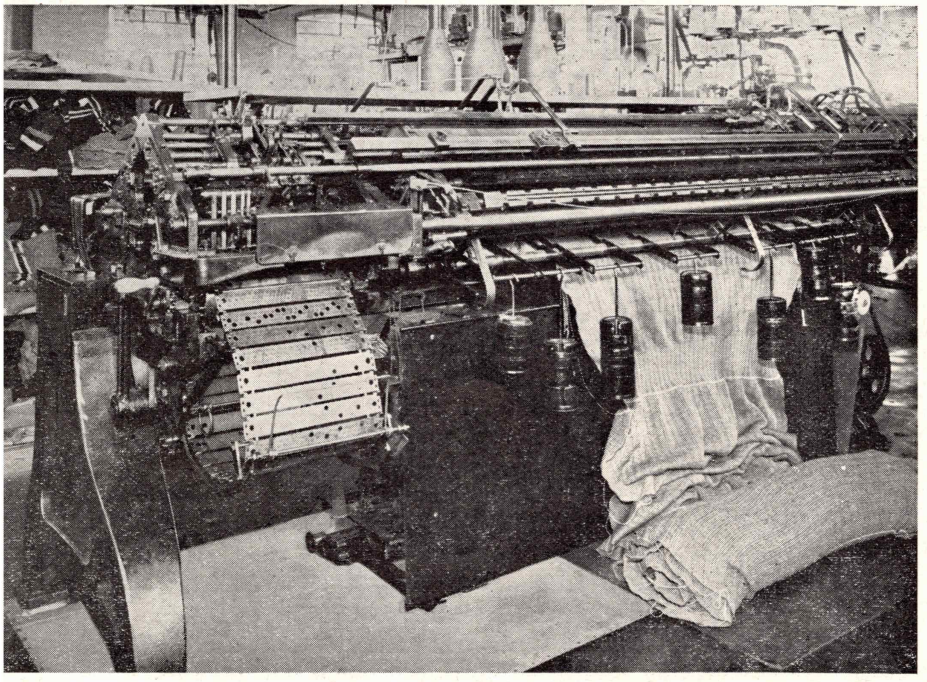
As an example of how fine our yarns are spun, one pound of average Roslyn worsted yarn measures about 12,000 yards, or over six miles, and we have at times spun one pound of wool into fifteen miles of yarn.

The majority of spun yarns have now to be "twisted" two or more together; weaving and knitting yarns are usually two-ply, while "Aotea" fingering is three- or four-ply. This twisting or folding is carried out on a twisting machine.

We have now described the two processes of making woollen and worsted yarn. Yarns from both processes at Roslyn now go into either the making of knitted or woven goods and we propose first of all to follow them to the knitting or hosiery section.



Rewinding in preparation for knitting.

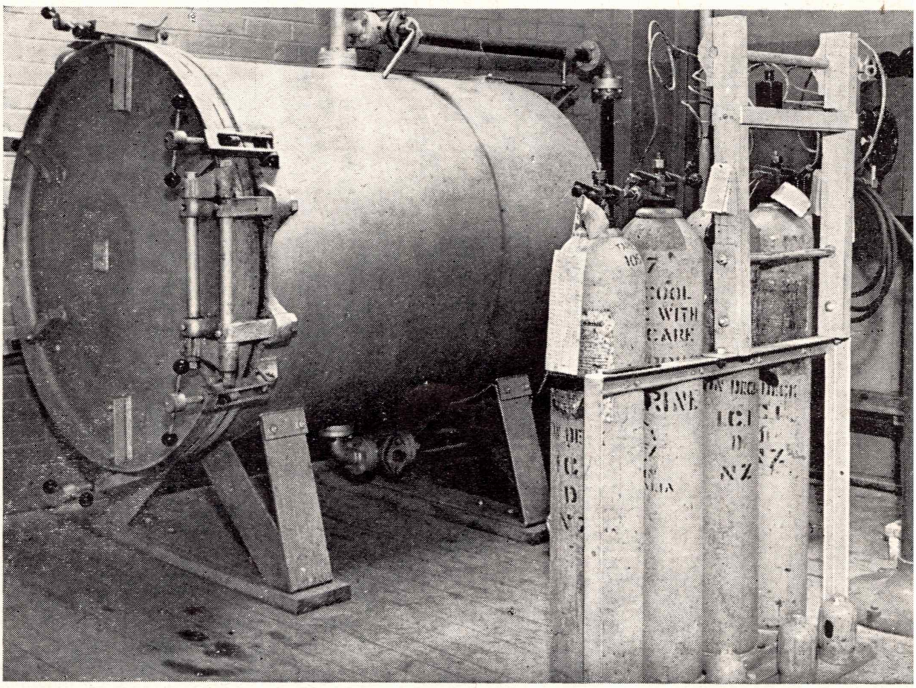


Flat-bed Jacquard Knitting Machine.

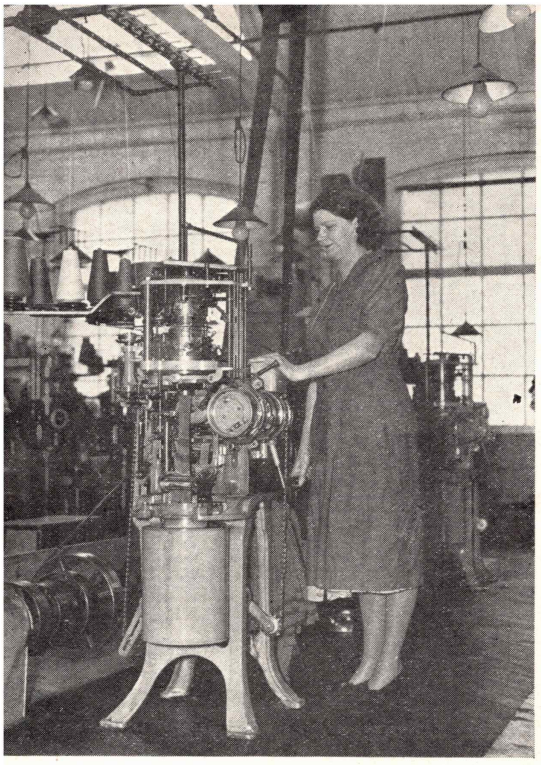
KNITWEAR

TAKING THE PRODUCTION of knitted goods for woollen underwear first, we find there are two distinct methods of making them. The oldest method is to knit the portions of the garments to the correct shape on a "Frame" machine. On the frame the yarn is laid along the row of needles and small fingers push the yarn between the needles so that when the needle bar descends, all the stitches are the same size and tension, the last row of stitches is then pulled over the top of the needle and the cycle starts again. Narrowing or widening of the fabric is carried out by an ingenious mechanism which lifts the outer stitches off the needles and either places them further out or closer in. These machines will knit at a speed of 134,400 stitches per minute. The portions of the garments are then joined up together in a linking or seaming machine. Underwear made on the Frames often has an extra splicing thread added during knitting, which, of course, greatly adds to the strength and wearing properties.

The second method is called "Circular" machine knitting which, as its name implies, means that the yarn is knitted into circular or tubular fabric from which the underwear garments



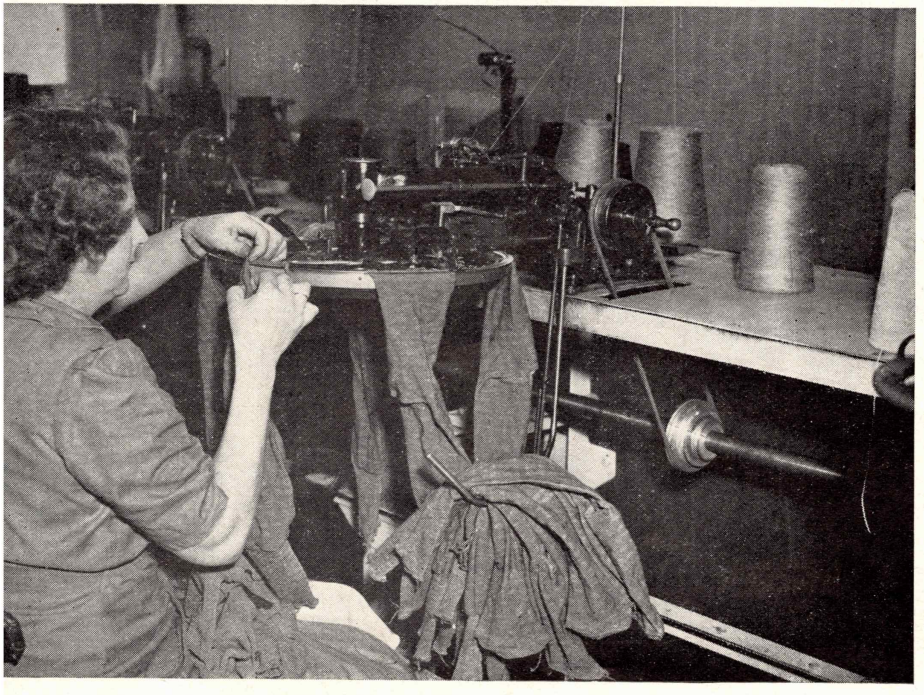
Dry Chlorination Plant.



Knitting Boys' School Hose.

are cut to shape and joined together by various types of special sewing machines. By the Circular method, we may use up to 16 yarn feeds at once, so that one revolution of the machine knits up to 16 rows of stitches every few seconds. In fact, one machine knits at the speed of 334,000 stitches per minute. Not only will these machines knit underwear, but in a more complicated form, will knit patterned fabric for twin sets, pullovers, cardigans, frocks, etc. These highly specialised machines will also transfer stitches from one set of needles to another, this giving a "bird's eye" effect to the fabric.

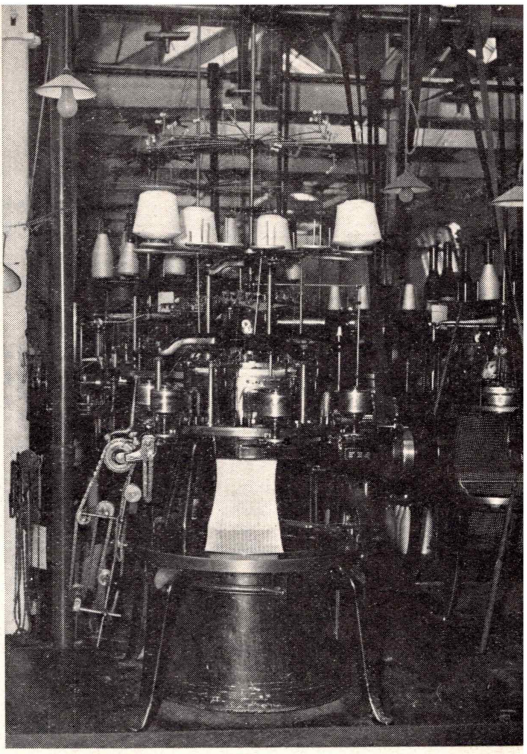
Other fine outerwear is



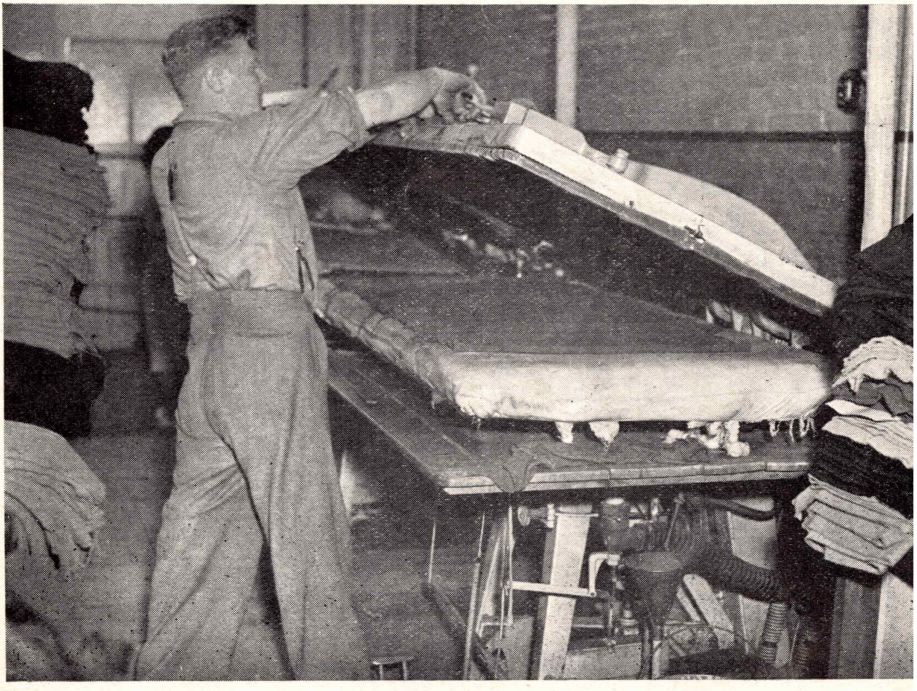
Linking Machine.

knitted on a flat-bed machine called a "Jacquard" and it is on this machine that most of the beautifully patterned fabrics are made. An almost endless variety of stitch and colour patterns can be made on these machines and here are made the highest quality garments.

The fourth and last class of machines are the small circular knitters which produce half-hose, school and golf hose. These machines use a double ended needle which combined with a system of small fingers called "selectors", produce rib and patterned hose. These machines knit an endless length of socks, reinforcing the heel and toe, and after



Circular Knitting Machine.



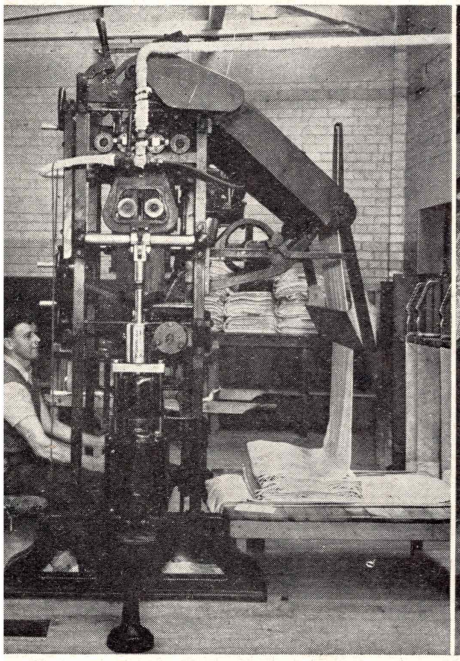
Pressing Garments.

being separated, only the toe of the sock remains to be joined up on the same type of machine as the linker.

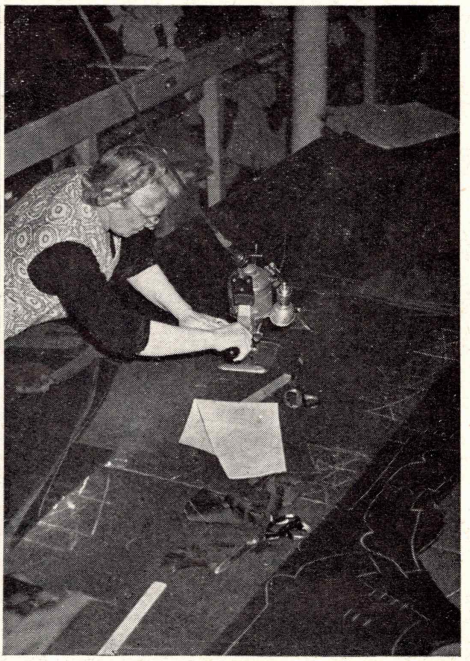
The different kinds of knitted fabric now pass to various types of washing machines, where extreme care must be taken to thoroughly clean the fabric without injuring its structure, and the underwear is treated to make it unshrinkable. Up to recent years this latter treatment was done by various methods of chemical bathing, which were very hard to control and the result was not always standard, but to-day at Roslyn a modern method is used called "dry chlorination".

This method was perfected in England by the Woollen Industries Research Association and can be simply described as the impregnation of chlorine gas into the fabric under the strict control of the Mill chemists. The procedure is to enter the fabric into a specially constructed chamber, exhaust the air and allow a measured quantity of chlorine to circulate through the fabric. The remaining chlorine is then withdrawn, the goods are tested and if up to standard, are removed.

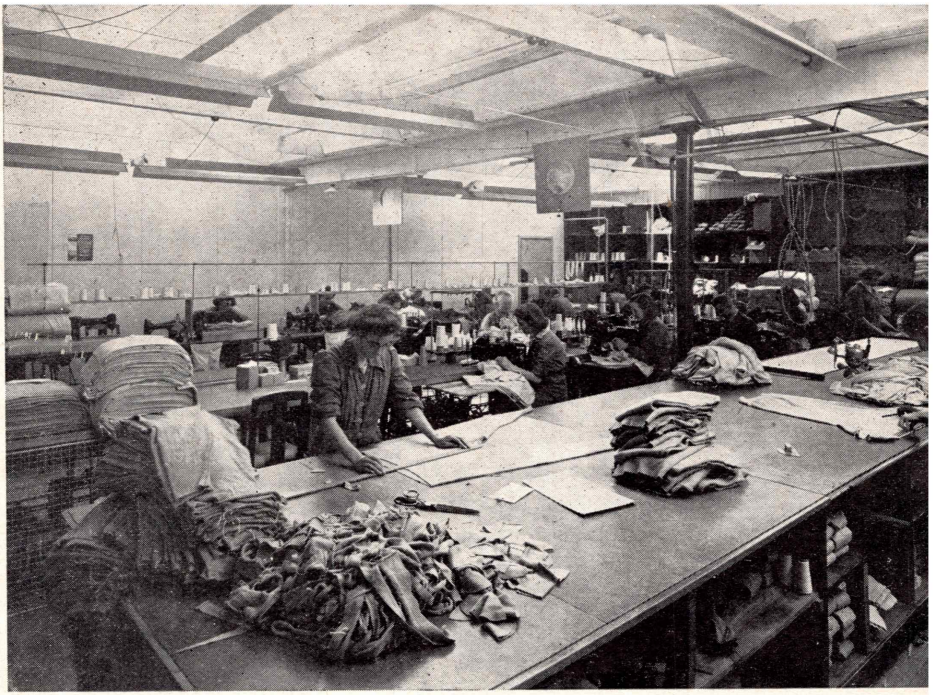
After chlorination the fabric is treated by other chemicals which remove and neutralise any small remains of chlorine which may be still present. Some fabrics are now given a chemical bleach to prevent "yellowing" after laundering.



(Left) Pressing Fabric.



(Right) Cutting Fabric for Cut Wear Garments.



Cutting Underwear.

Part of the Making-up Room.

PREPARING FOR WEAVING

WOVEN FABRICS consist of interlacing threads, the ones running lengthwise being called "warp" and the threads running from side to side "weft". When the weaving yarns come from the worsted and woollen spinning departments they are taken into the yarn store, where they are kept in bins according to thickness, quality, shade and blend number. The threads to form the warp are wound from the various types of spinning bobbins on to cylindrical spools which are mounted in a "creel" ready to make a "warp" of the correct number of threads, at the same time fitting in the colours to form stripe patterns. The "weft" is wound on to wooden bobbins which are the correct size to fit the shuttle of the loom during the weaving operation. During this process faulty yarn and imperfect knots are removed, and careful work in this department saves much trouble in the subsequent processing.

Warping and Drawing

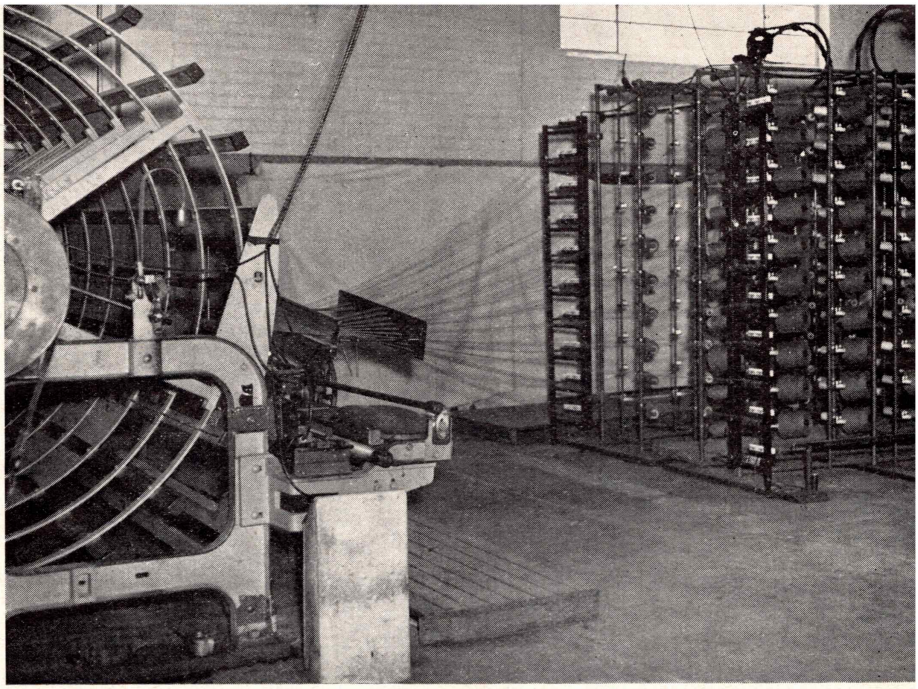
THE WARP MILL with its large circular "balloon" takes the threads from the 240 "bobbins" or "cheeses" in the creel and winds them in the correct position to form the proper width, length and pattern of the cloth. When the large warp mill has been built up in sections, each of which is the same width on the balloon as it is on the loom, the threads are rewound at full width on to a large spool called a "beam" which is later mounted on to the weaving machine or loom.

The end of every thread in the warp beam is now drawn through an eye in the "heald" or "shaft" in the correct order so that, when the healds rise and fall in the loom, the threads form a shed through which the weft shuttle passes. This order of drawing is therefore made according to the pattern of the cloth as pre-determined by the designer. After the threads have been drawn through a "reed" to keep them the right distance apart and in the correct position, the beam of yarn is then ready to be harnessed into the loom for weaving.

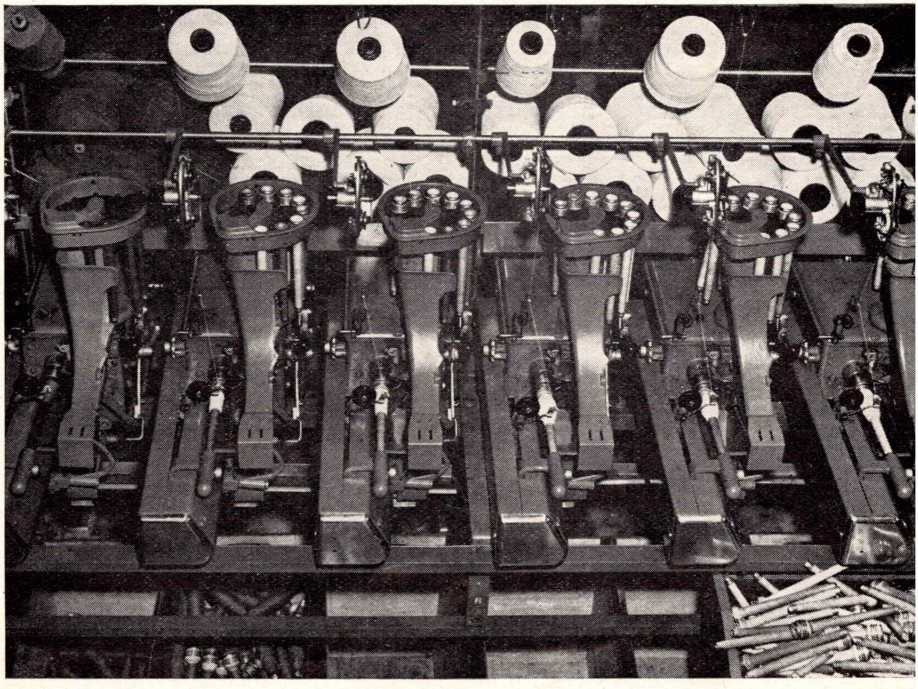
It will be realized that these operations call for great skill and dexterity from the operatives, and here, as well as in other departments, pride of craftsmanship plays a great part.

THE ART OF WEAVING

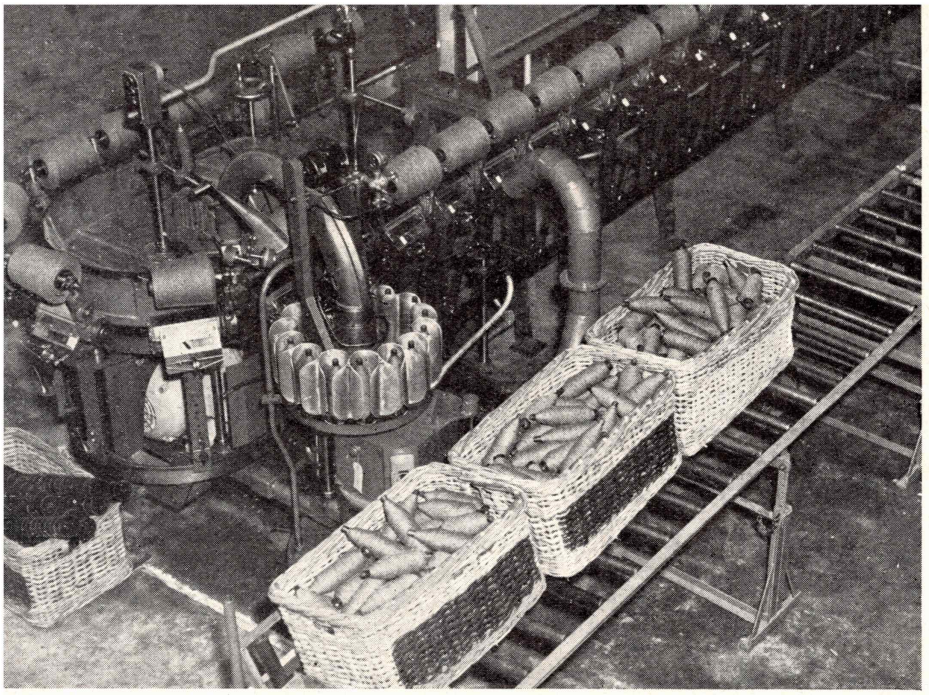
THE ORIGIN of the art of weaving is lost in antiquity—we know that the ancients knew it, the mummies of the ancient Egyptians were wrapped in woven fabric, and the oldest records of history in the Old Testament speak of robes of cloth, as for instance, Joseph's coat of many colours must have been woven. In Persia India, Peru and many other places weaving is practised in just



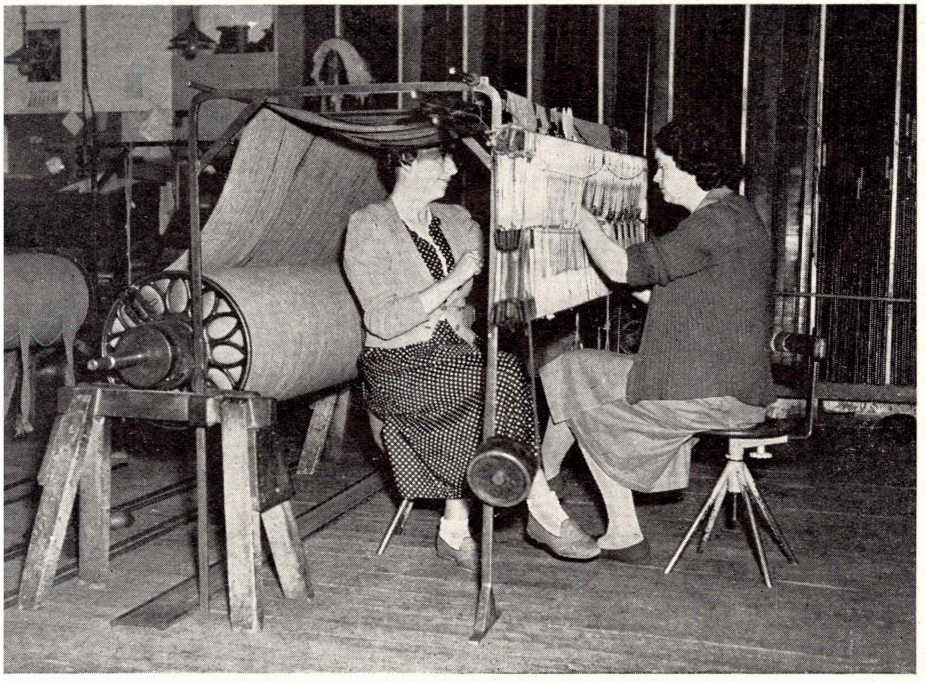
The Warp Mill, preparing the Warp for Weaving.



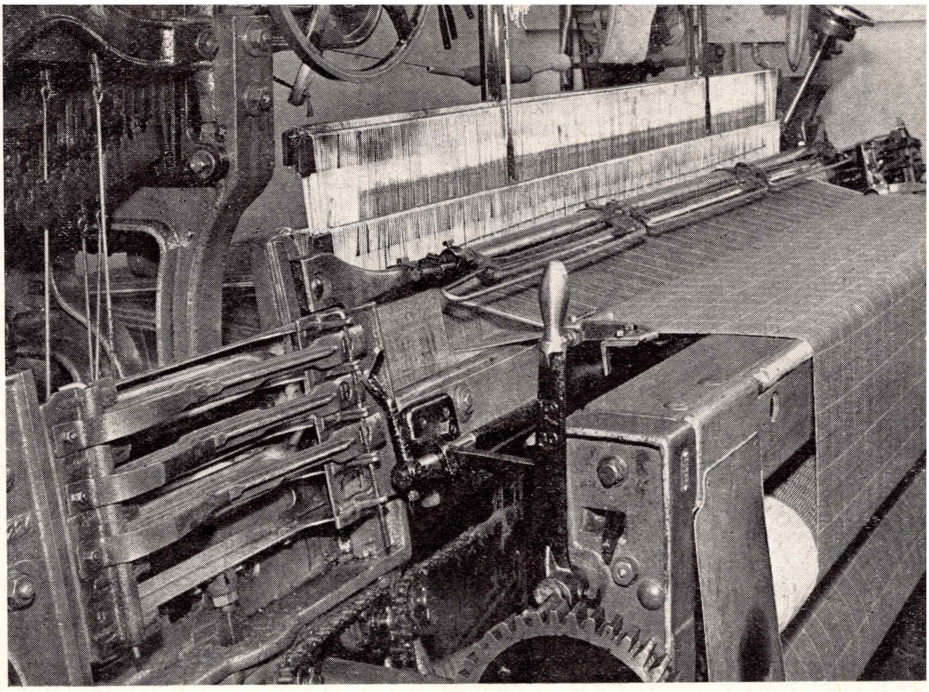
Automatic Weft-winding for Weaving.



Automatic Cone-winding for Warping.



Drawing in the "Healds" and "Reed."



Weaving Loom.

the same way as the ancients knew it, and many fine examples of their craft may still be obtained.

The art was first largely introduced into England by Edward III when he induced many Flemish weavers to come to that country to manufacture the product of the English sheep. Since then, the industry has settled mostly in the West Riding of Yorkshire, the west of England and the Scottish border country. Many of the old weavers from these places came to Roslyn, and the art has been kept alive right up to the worthy place it holds in the ranks of craftsmanship.

There are many types of looms operating to-day, and machine makers have progressed a long way since the old days, but the craft remains. It is in the loom that the warp threads divide—some up, some down—while the shuttle flies across between them carrying the weft threads which are beaten in thread by thread, making cloth. The pattern is controlled by the order in which the threads have been warped.

A tremendous variety of fabrics can be made on our general purpose looms which hold up to twenty-four heald shafts and can work with a maximum of seven shuttles. The loom automatically releases the warp from the warp beams and winds the woven cloth on to a piece beam, inserts the correct number of weft threads per inch and stops when a weft thread breaks. The cloth is generally woven in sixty- to seventy-yard pieces, usually greater in width than the finished cloth, to allow for subsequent shrinkage when washed.

The basic weave structure is the plain weave which is achieved by having each of the warp threads which run the length of the cloth rise and fall alternately over each of the weft or filling threads. Variations in weave are almost without limit.

Automatic Weaving Section

AUTOMATIC MACHINERY is used to produce certain plain types of cloth. The winding of the cones for the high-speed creel used for this type of weaving carries out all its actions automatically, and the operator has only to fill a magazine with charged spinning bobbins and remove the full cones.

The high-speed creel into which the cones are placed and the warp mill connected to it are also far more automatic than those ordinarily used and can construct a warp of more than 1,000 yards in length. The weft bobbins are wound also on a new winder which automatically places the bobbins in the winding position, starts winding, stops when a thread breaks and finally empties full bobbins into a container. The automatic looms have all the motions of the ordinary loom, plus an automatic action which inserts a full bobbin into a shuttle containing an empty one and a warp stop device.

Finishing the Woven Cloth

THE WOVEN FABRICS must now be examined for defects and the darners and menders replace any faulty threads; any knots are loosened and pushed to the back of the cloth so that they do not show to spoil the surface. Skill and precision are again called for here, and this work must be done by hand, as the mending means the weaving in of new threads to correct minor weaving defects and other imperfections.

While the foundation of the cloth has been formed in the loom, it is the finishing process which gives it its final character.

The cloth now enters the milling and scouring room where it is first necessary to wash it in a solution of soap and chemicals to remove all the oil that has been added to the wool during spinning and the dirt acquired during weaving. During the milling process, the cloth is shrunk to its correct width, length and type of surface by the action of moisture, heat and pressure. An ample supply of soft water is essential for efficient scouring and at Roslyn there is a very modern water softening plant. In the drying machine, the cloth is suspended on pins while hot air is blown through it. In this machine, called a tentering machine, we have the modern version of being on "tenter hooks", one of the many expressions the industry has contributed to our language.

Piece-dyed cloths are sent to the dyeing department after the initial drying and are then completely dried after the dyeing.

The cloth now goes through many processes of finishing, according to the nature of the cloth and its future usage. Cloths, such as worsted suitings, requiring a clear finishing showing the pattern design, are put through a cropping machine which cuts off the surface fibres in the same manner as a lawn mower. Some woollen fabrics have the fibres on the face raised by brushing or napping so that the texture of the weave is completely hidden, and this napping is carried out by rollers covered with wires which nap the fibres and pull their ends free from the mass to give a furry or napped surface. Cloths, such as men's worsted and woollen suitings and women's dress materials may, after cropping, be brushed and steamed.

After pressing, the materials are finally examined for faults —blankets are whipped and labelled—and cloth is folded by a machine which also rolls it on to a board, at the same time measuring the length. The cloth rolls are now ready for delivery to the factory which will later make the famous Roslyn garments.

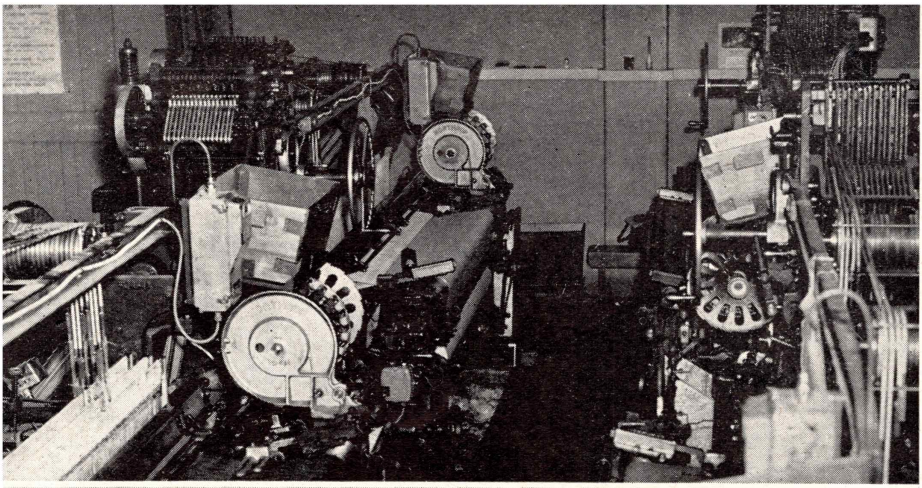
We have attempted to describe briefly the art, mechanics and craftsmanship of our industry, but we have not yet mentioned the science which we also introduce to the manufacture of our goods. We have a well equipped laboratory in the charge of a trained chemist and staff where a large scale series of chemical and physical tests are carried out.

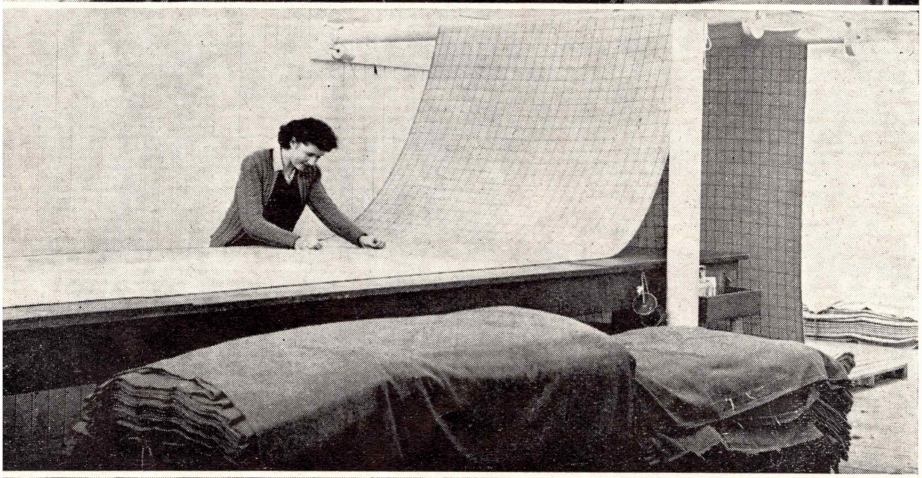
Chemical control of many of our processes is made possible in this way and the high standard of our products is maintained in all sections.

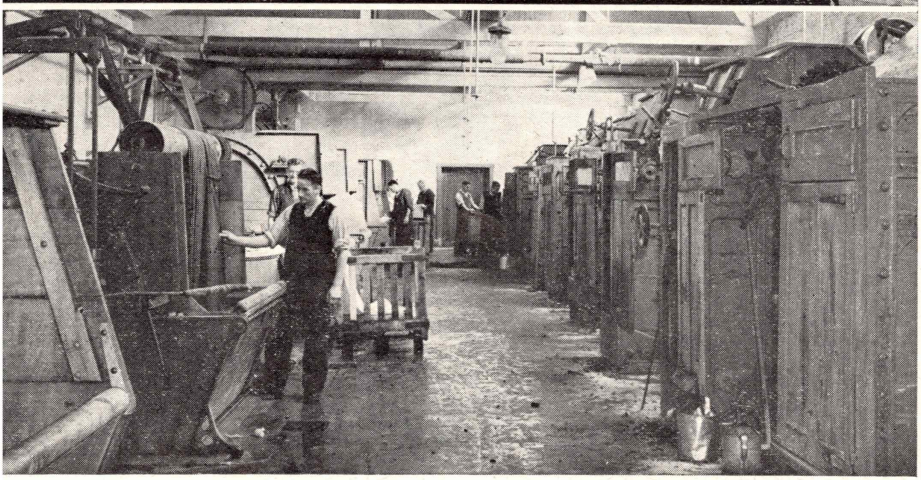
It would be impossible in this booklet to describe in detail all the processes involved in our industry, and it would be difficult to say which processes have the largest influence on the excellence of our productions. Suffice it to say that the fullest co-operation of effort and skill is essential from all departments.

At Roslyn there is opportunity for the boy to become a tradesman and for the girl to become a craftswoman. There are graceful jobs for the girls, dignified occupations, cheerful companionship, pride of craft and the knowledge of the part taken in the production of goods of quality. We have many instances of fifty years of continuous service at Roslyn, many others of three generations of the same family working with us, and we have one instance of two brothers who served one hundred and eighteen years between them.

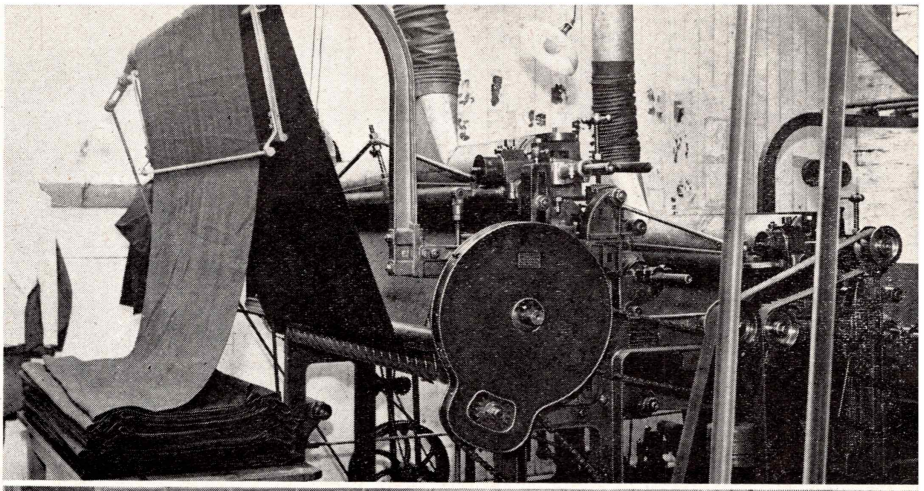
These are things we are proud of, and no girl or boy need be afraid that merit will not be recognized at Roslyn. We have been making the highest quality goods for over three-quarters of a century; come and help us to make a lot more and continue to say "Well Made New Zealand" at Roslyn.

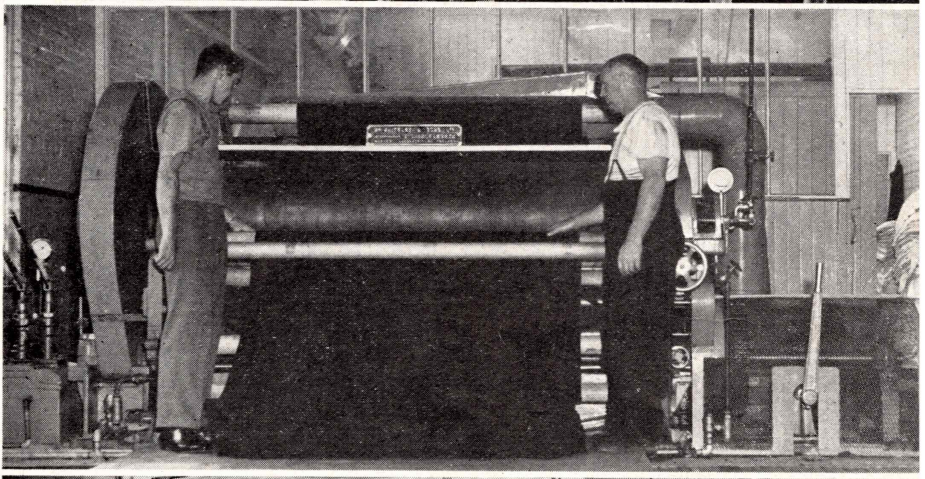


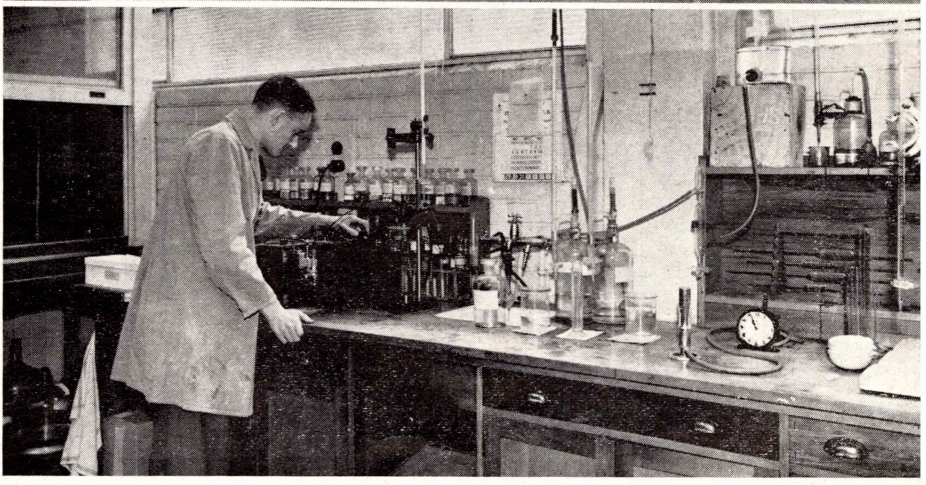




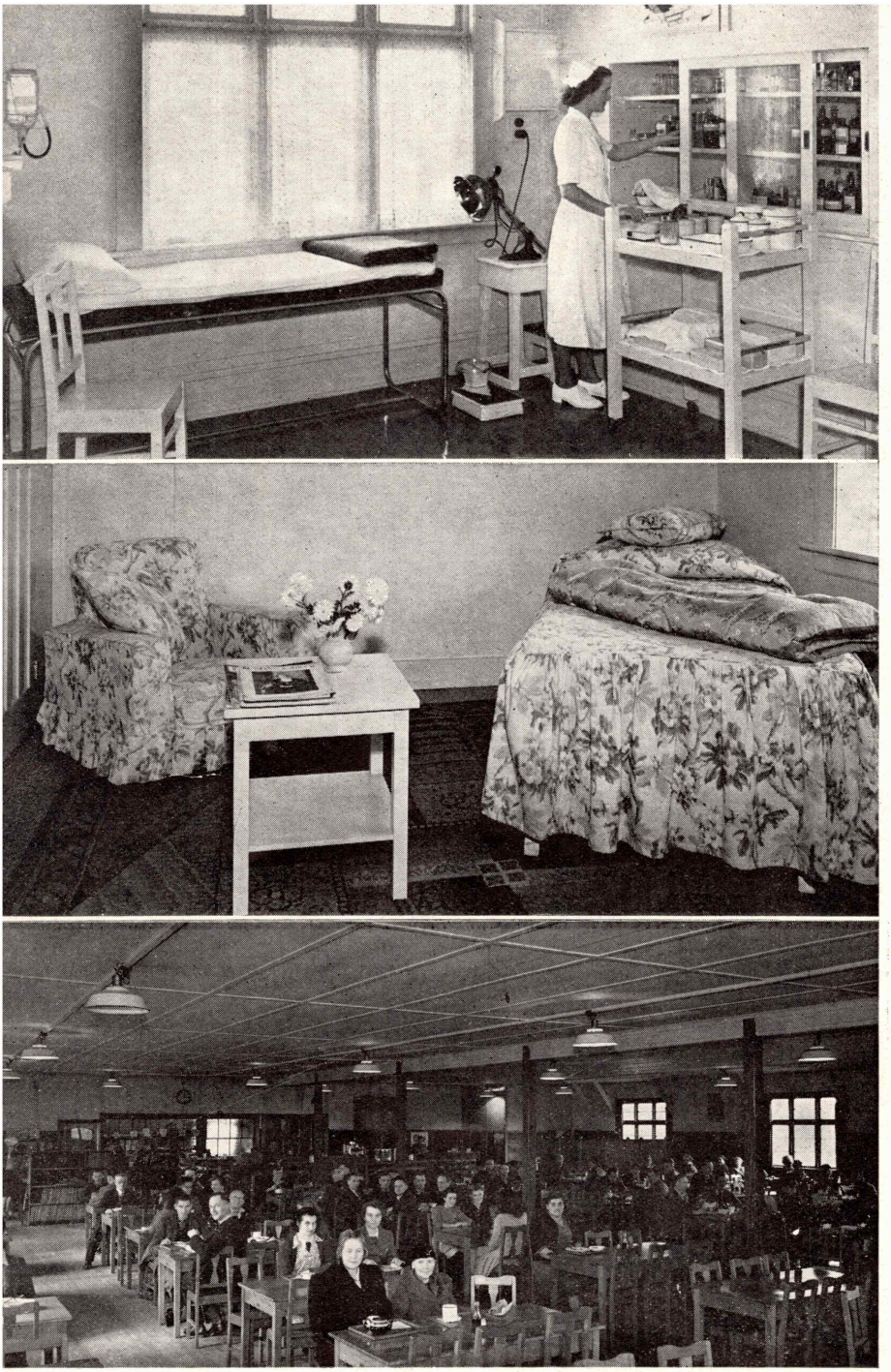
(Upper) View of some of the Automatic Looms. (Middle) Inspecting the cloth for flaws. **(Lower) Milling and Scouring Room.**



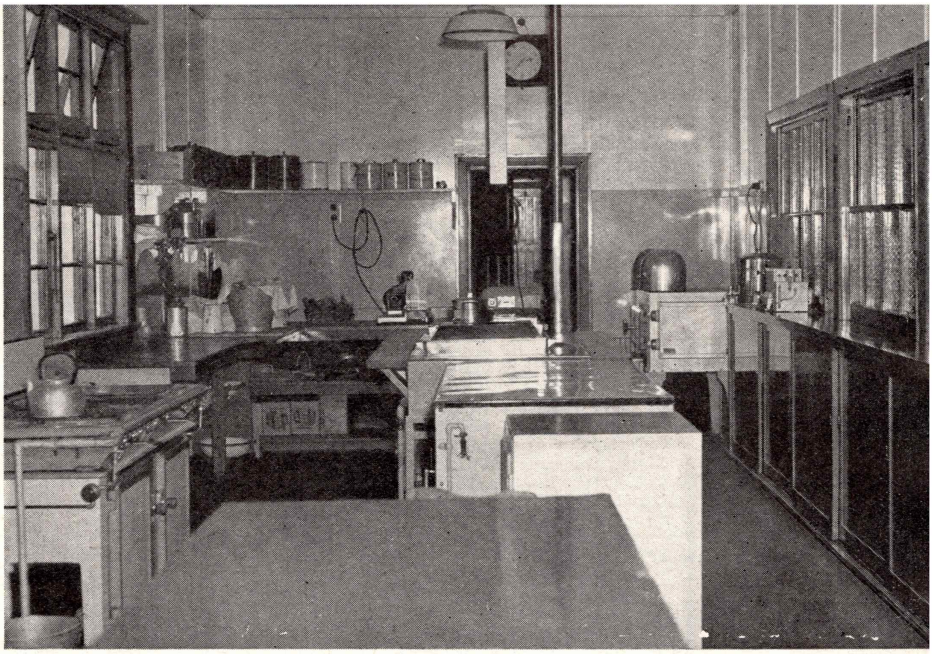




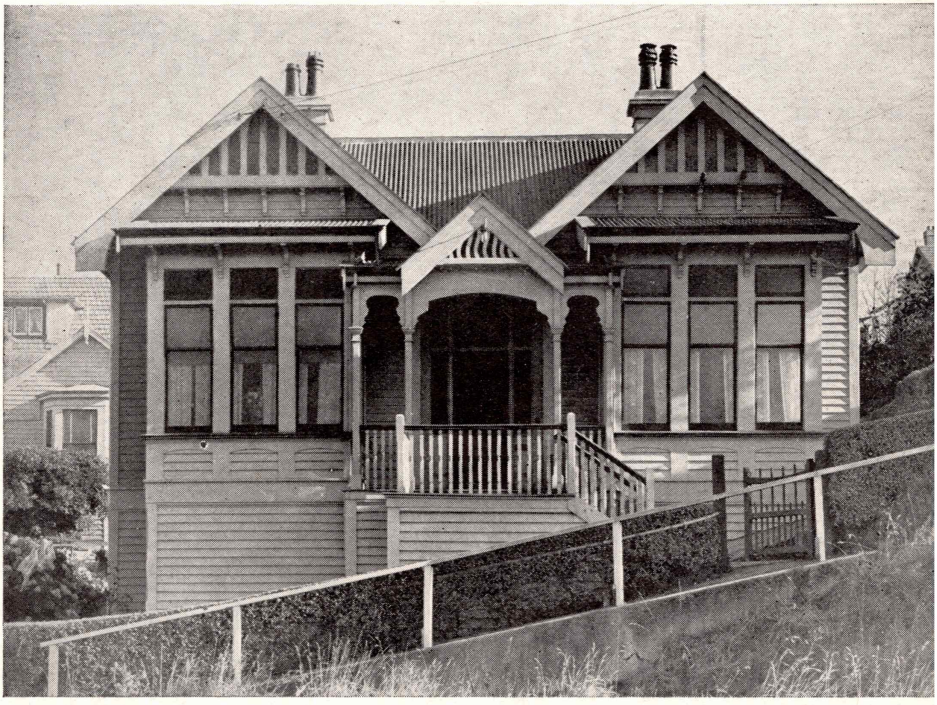
(Upper) Cropping Machine. (Middlle) Pressing the Coth.
(Lower) The Roslyn Mill Chemist.



(Upper) The Sister in the Treatment Room. (Middle) One of the Clinic Rest Rooms. (Lower) Cafeteria.

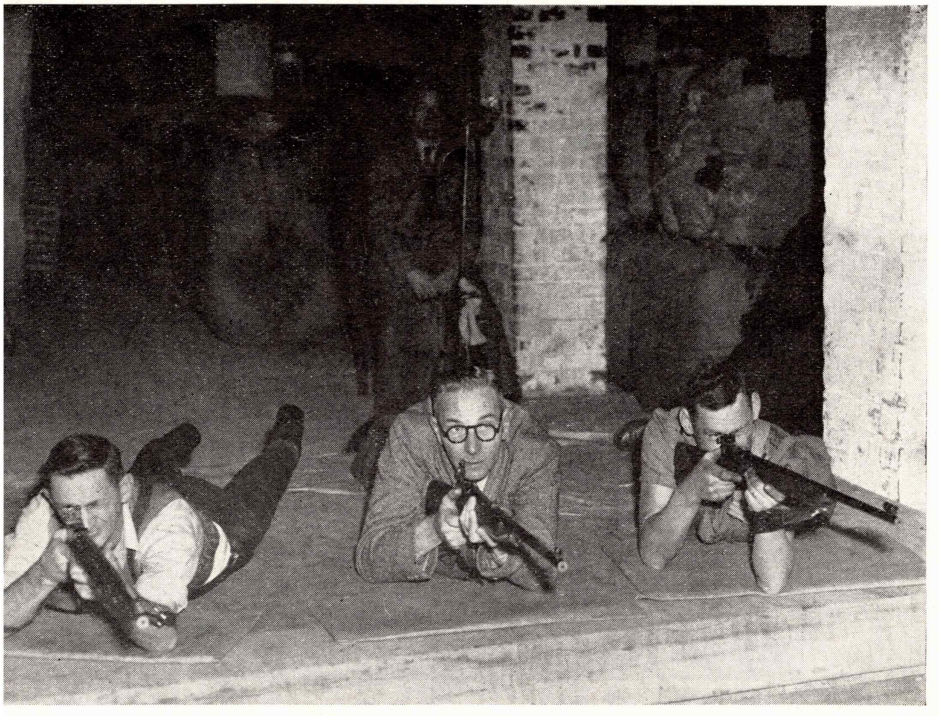


The Cafeteria Kitchen.



The Hostel for country girls.

A Table Tennis Team.



On the Mill Miniature Rifle Range.

OUR CAFETERIA, a building detached from the rest of our undertaking, comprises a large dining room built to accommodate 300 persons, together with a kitchen and bakehouse fitted with all labour saving devices and modern equipment. Here a permanent staff prepares hot meals daily, while sandwiches, scones, cakes, soft drinks, ice cream, etc. are always available.

The Health Clinic, a unit of four rooms, has been carefully planned and equipped in all requirements for routine treatments, with special provision for cases of emergency. The clinic is under the charge of a qualified Sister, while a doctor pays regular visits to the clinic for any special cases. Two rooms are tastefully furnished and used as rest rooms. The surgery has that "spick" air we associate with a civic hospital, while the waiting room has its warm and cheerful appearance.

Throughout the Mill departments the progressive installation of fluorescent strip lighting is a feature which in recent years, has claimed priority. To date, 1,100 units have been fitted.

To provide comfortable accomodation for girls from the country, a hostel has been opened under the charge of a housekeeper. As the Mills are situated away from the centre of Dunedin, transport has always been a problem and the Company now supplies free buses to and from the city and suburbs for its Mill employees.

The management is most interested in all the social and sports activities organised by the employees and is proud indeed of their achievements. In this field, the Benefit Society has a membership of almost 200 males who contribute fortnightly and receive payments for loss of earnings through sickness or accident.

The marching team "Aotea" has reached a very high standard and has won honours in several championships.

For twenty years our Cricket Team has played in League competitions and has won numerous honours. Recently a Ladies' Cricket Team was formed and has commenced play in the local ladies' competitions. The Men's and Ladies' Basketball Clubs have had several teams in the local competitions, while the Table Tennis Club has rapidly gained in strength and popularity.

The Social Club, for a number of years, has run highly successful dances monthly, and, more recently, euchre evenings.

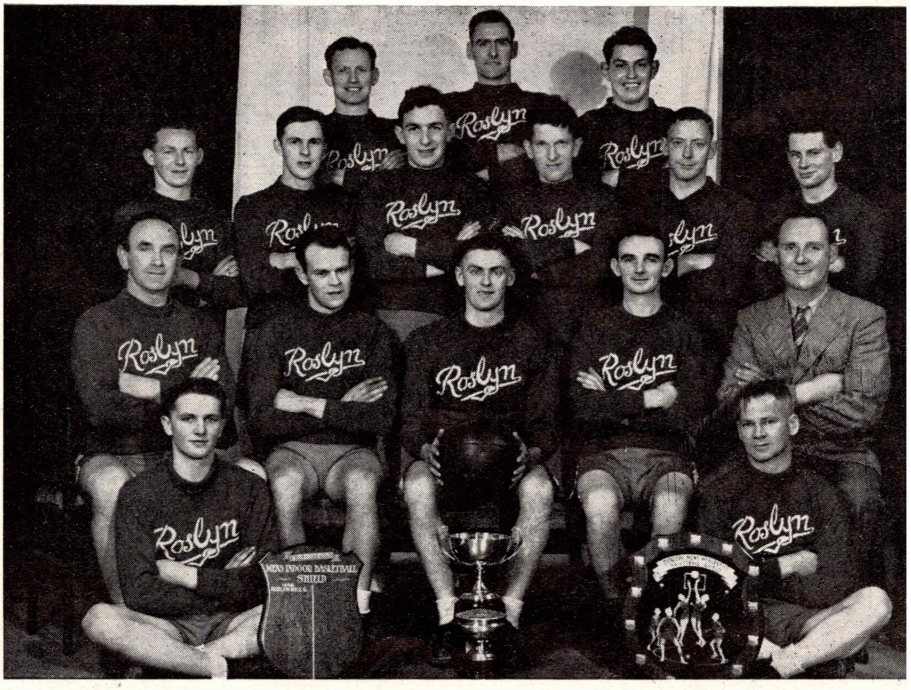
To co-ordinate the aims and objects of all the activities and to generally offer assistance a representative executive committee has been constituted.

In all there is healthy happy work at Roslyn, together with the satisfaction of being able to help play a part in the production of the best in woollen goods.

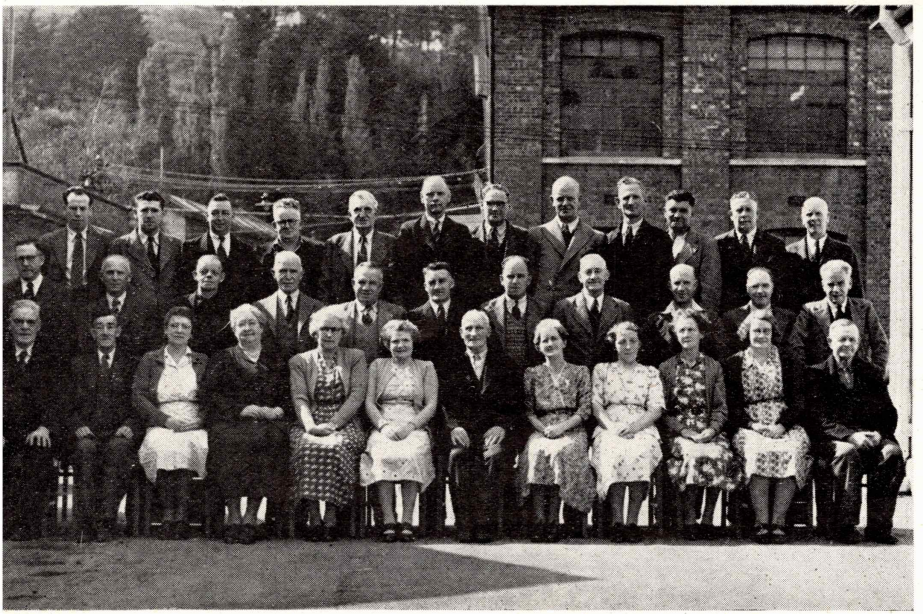
Social Evening in the Cafeteria.

Aotea Marching Team.

Roslyn Cricket Team.

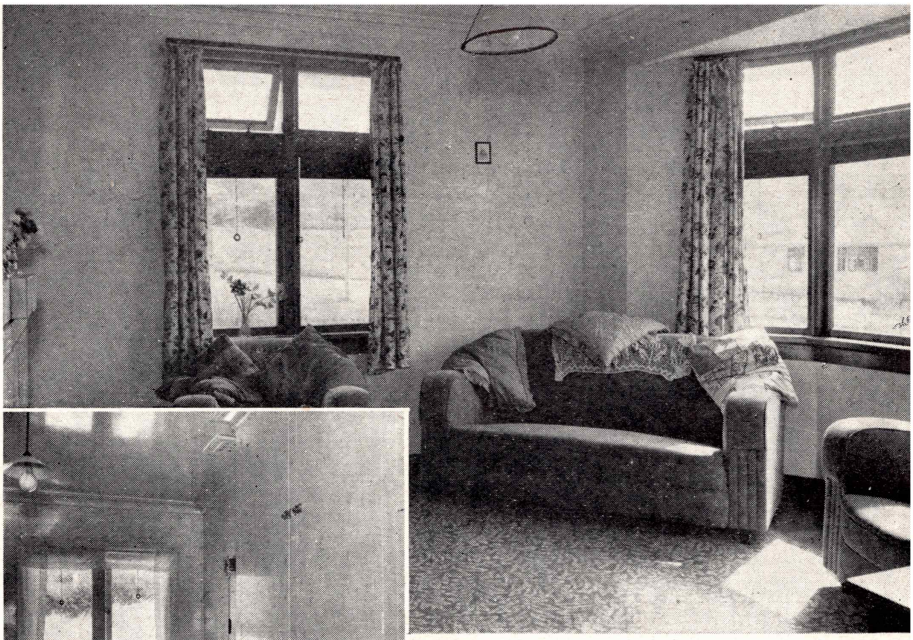


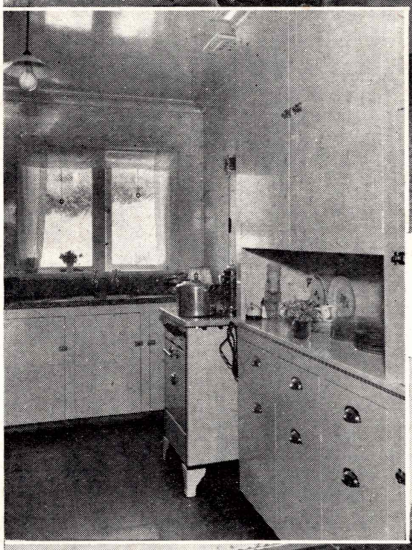
Roslyn Basketball Team.



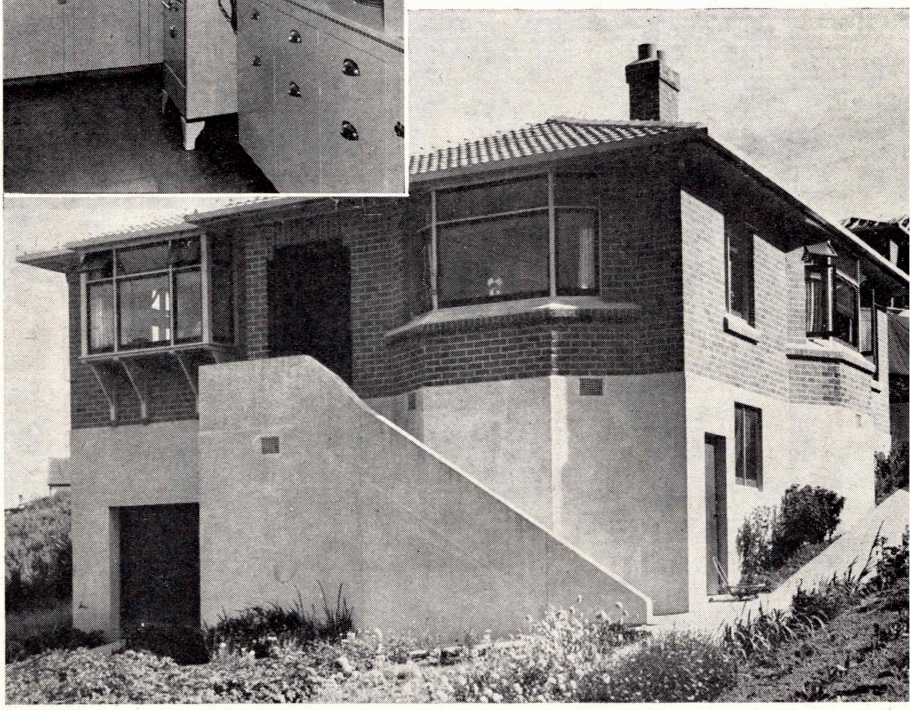
Twenty-five years' service and over.

Executive Staff at Roslyn.





Three Views of one of the Staff Houses.



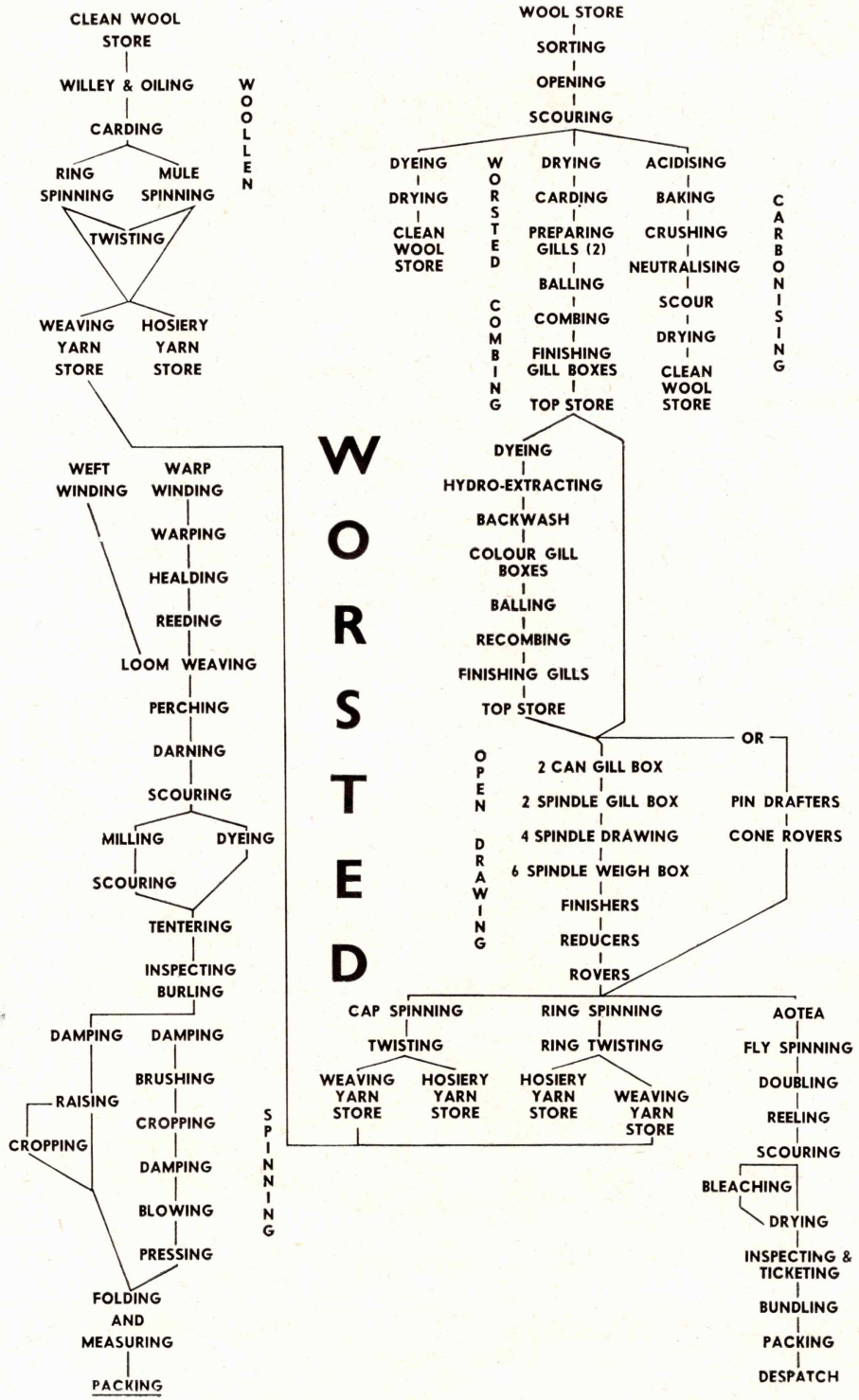
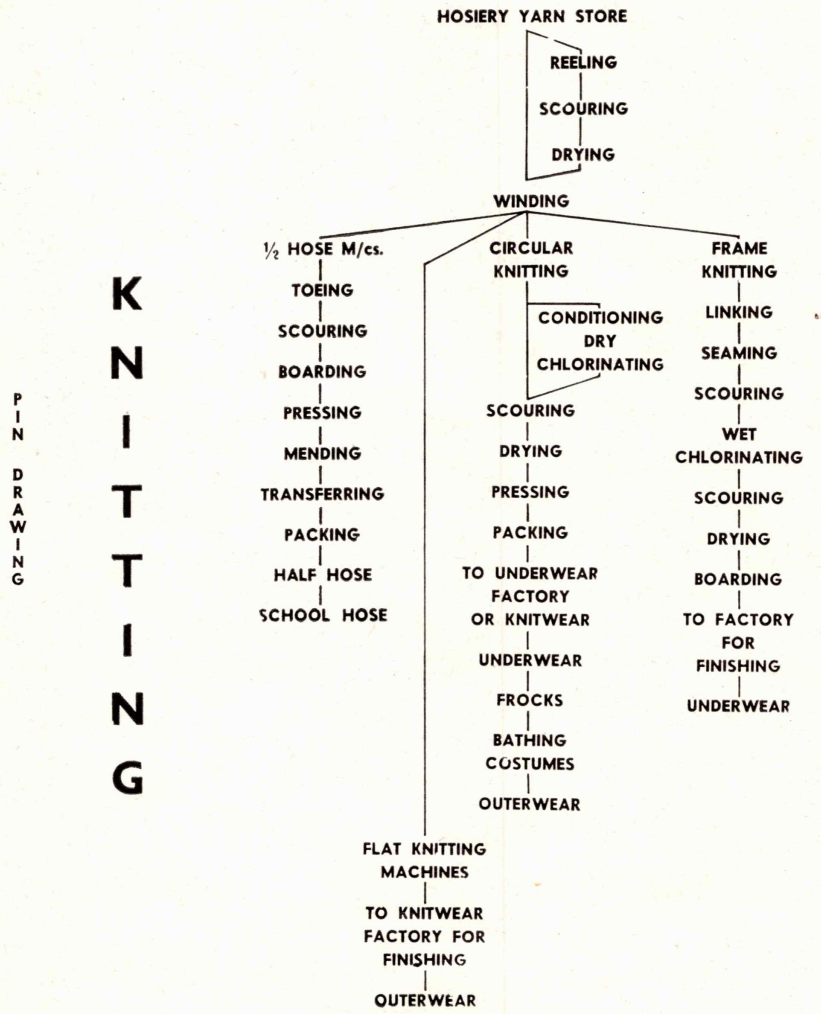

WOOLLEN
CLEAN WOOL STORE
WILLEY & OILING
CARDING
RING SPINNING
MULE SPINNING
TWISTING
WEAVING YARN STORE
HOSIERY YARN STORE
WEFT WINDING
WARP WINDING
WARPING
HEALDING
REEDING
LOOM WEAVING
PERCHING
DARNING
SCOURING
MILLING
DYEING
SCOURING
TENTERING
INSPECTING BURLING
DAMPING
DAMPING
BRUSHING
RAISING
CROPPING
CROPPING
DAMPING
BLOWING
PRESSING
FOLDING AND MEASURING
PACKING
SPINNING
WORSTED
WOOL STORE
SORTING
OPENING
SCOURING
DYEING
DRYING
CLEAN WOOL STORE
WORSTED COMBING
DRYING
CARDING
PREPARING GILLS (2)
BALLING
COMBING
FINISHING GILL BOXES
TOP STORE
ACIDISING
BAKING
CRUSHING
NEUTRALISING
SCOUR
DRYING
CLEAN WOOL STORE
CARBONISING
DYEING
HYDRO-EXTRACTING
BACKWASH
COLOUR GILL BOXES
BALLING
RECOMBING
FINISHING GILLS
TOP STORE
OR
OPEN DRAWING
2 CAN GILL BOX
2 SPINDLE GILL BOX
4 SPINDLE DRAWING
6 SPINDLE WEIGH BOX
FINISHERS
REDUCERS
ROVERS
PIN DRAFTERS
CONE ROVERS
CAP SPINNING
TWISTING
WEAVING YARN STORE
HOSIERY YARN STORE
RING SPINNING
RING TWISTING
HOSIERY YARN STORE
WEAVING YARN STORE
AOTEA
FLY SPINNING
DOUBLING
REELING
SCOURING
BLEACHING
DRYING
INSPECTING & TICKETING
BUNDLING
PACKING
DESPATCH

Diagram showing order of Worsted and Woollen Processes



HINTS FOR WOOLLENS

Although wool is such a wonderful fibre for the manufacture of human clothing it can be damaged, particularly in the washing of woollen underwear, if reasonable care is not taken.

If we remember that wool can actually be destroyed by combinations of soda and heat we understand why the following simple rules should be observed. All "Roslyn" underwear is specially treated against shrinkage, and if the rules are adhered to maximum garment life may be expected.

RULES

1. To remove perspiration, rinse the garments in plenty of clean luke-warm water before using the soap. For undyed fabrics only, add 1 tablespoon of ammonia to every 4 gallons.
2. Dissolve 2 ozs. best soap *only* in 4 gallons of luke-warm water.
3. Swish the garments about and press the suds through them. *Never rub* and *never* leave to soak.
4. Do not wash in washing machine.
5. Rinse in 3 changes of clean luke-warm water (add ammonia for undyed fabrics only as above).
6. Squeeze (rubber wringer best). Do not twist.
7. Stretch to shape at once. Hang till nearly dry.
8. Stretch to shape again. Iron while slightly damp.

NEVER rub or wash vigorously.

NEVER use hot water.

NEVER use ammonia with dyed fabrics.

Old Mill Staff 1888.

Staff of Roslyn Worsted and Woollen Mills

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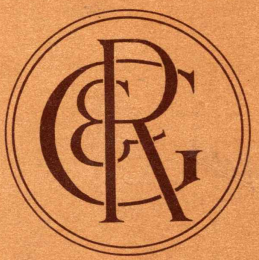

Roslyn

WORSTED & WOOLLEN MILLS

DUNEDIN